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PATENT

Docket No. 1232-4442

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

UTILITY APPLICATION AND FEE TRANSMITTAL

ASSISTANT COMMISSIONER FOR PATENTS  
Box Patent Application  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

First named Inventor  
or Application Identifier: Toshiyuki Matsumoto

For: PHOTOGRAPHIC METHOD AT TIME OF SELF-PHOTOGRAPHY, AND IMAGE  
SENSING APPARATUS THEREOF

Enclosed are:

42 page(s) of specification, 1 page(s) of Abstract, 11 page(s) of claims

26 sheets of drawing (Figs. 1-26)  formal  informal

6 page(s) of Declaration and Power of Attorney

Unsigned  
 Newly Executed  
 Copy from prior application

Deletion of inventors including Signed Statement under 37 C.F.R. § 1.63(d)(2)

Incorporation by Reference: The entire disclosure of the prior application, from which a copy of the combined declaration and power of attorney is supplied herein, is considered as being part of the disclosure of the accompanying application and is incorporated herein by reference.

Microfiche Computer Program (Appendix)

       page(s) of Sequence Listing

computer readable disk containing Sequence Listing

Statement under 37 C.F.R. § 1.821(f) that computer and paper copies of the Sequence Listing are the same

Assignment Papers (assignment cover sheet and assignment documents)

A check in the amount of \$40.00 for recording the Assignment.

Assignment papers filed in parent application Serial No. \_\_\_\_\_.

Certification of chain of title pursuant to 37 C.F.R. § 3.73(b).

Certified copy of Priority Document(s)

English translation documents

Information Disclosure Statement

Copy of \_\_\_ cited references

Preliminary Amendment

Return receipt postcard (MPEP 503)

This is a [ ] continuation [ ] divisional [ ] continuation-in-part (C-I-P) of prior application serial no. \_\_\_\_\_.

Cancel in this application original claims \_\_\_\_\_ of the parent application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

A Preliminary Amendment is enclosed. (Claims added by this Amendment have been properly numbered consecutively beginning with the number following the highest numbered original claim in the prior application.)

The status of the parent application is as follows:

A Petition For Extension of Time and a Fee therefor has been or is being filed in the parent application to extend the term for action in the parent application until \_\_\_\_\_.

A copy of the Petition for Extension of Time in the co-pending parent application is attached.

No Petition For Extension of Time and Fee therefor are necessary in the co-pending parent application.

Please abandon the parent application at a time while the parent application is pending or at a time when the petition for extension of time in that application is granted and while this application is pending has been granted a filing date, so as to make this application co-pending.

Transfer the drawing(s) from the parent application to this application.

Amend the specification by inserting before the first line the sentence:  
This is a [ ] continuation [ ] divisional [ ] continuation-in-part of co-pending application Serial No. \_\_\_\_\_ filed \_\_\_\_\_.

## I. CALCULATION OF APPLICATION FEE

						Basic Fee
	Number Filed		Number Extra		Rate	\$ 790.00
<b>Total Claims</b>	30	-20=	10	x	\$22.00	\$ 220.00
<b>Independent Claims</b>	9	- 3 =	6	x	\$82.00	\$ 492.00
<b>Multiple Dependent Claims</b>						
	[ <input type="checkbox"/> ] yes		Additional fee	=	\$270.00	\$
	[ <input checked="" type="checkbox"/> ] no		Additional fee	=	NONE	

Total: \$1,502.00

[ ] A statement claiming small entity status is attached or has been filed in the above-identified parent application and its benefit under 37 C.F.R. § 1.28(a) is hereby claimed. Reduced fees under 37 C.F.R. § 1.9(F) (50% of total) paid herewith \$\_\_\_\_\_.

[X] A check in the amount of \$1,502.00 in payment of the application filing fees is attached.

[ ] Charge Fee(s) to Deposit Account No. 13-4500. Order No.\_\_\_\_\_. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

[ X ] The Assistant Commissioner is hereby authorized to charge any additional fees which may be required for filing this application, or credit any overpayment to Deposit Account No. 13-4500, order no. 1232-4442 A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,

MORGAN &amp; FINNEGAN, L.L.P.

By:   
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Dated: May 11, 1998

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PATENT  
Docket No. 1232-4442

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Toshiyuki Matsumoto and Kyoji Tamura  
Serial No. : TBA Group Art Unit: TBA  
Filed : Herewith (May 11, 1998) Examiner: TBA  
For : PHOTOGRAPHIC METHOD AT TIME OF SELF-PHOTOGRAPHY, AND IMAGE SENSING APPARATUS THEREFOR

EXPRESS MAIL CERTIFICATE

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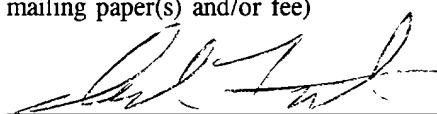
Date of Deposit May 11, 1998

I hereby certify that the following attached paper(s) and/or fee  
Application Fee Transmittal; 42 pp. of specs., 11 pp.  
claims (30 TOTAL claims) and 1 p. Abstract; 26 sheets of Formal  
Drawings (Figs. 1-26); Check for \$1,502.00 (filing fee); 6 pp. of Executed  
Declaration/POA; Assignment Recordation Form Cover Sheet and 1 pp. Executed  
Assignment; Check for \$40.00; and Certificate of Express Mail (Label No.  
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is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under  
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TITLE OF THE INVENTION

PHOTOGRAPHIC METHOD AT TIME OF SELF-PHOTOGRAPHY, AND IMAGE  
SENSING APPARATUS THEREFOR

5

BACKGROUND OF THE INVENTION

This invention relates to an image sensing apparatus such as a video camera or digital still camera and, more 10 particular, to self-photography in which the photographer faces the apparatus to shoot video of him/herself.

The construction and operation of an image sensing apparatus according to the prior art will be described with reference to the block diagram of Fig. 16.

15 The image sensing apparatus shown in Fig. 16 includes a lens group 1 for forming the image of a subject. The lens group 1 constructs a zoom lens having a stationary first lens group 101, a variable power lens 102 for varying power, a stationary second lens group 103 and a focus compensating 20 lens (referred to as a "focusing lens" below) 104 having a function for correcting movement of the focal plane that accompanies zooming and a function for focusing. A zoom lens motor 3 drives the variable power lens 102 of the zoom lens 1 to decide the zoom position, and a variable power lens drive 25 unit 7 drives the variable lens motor 3. A zoom lens drive unit 4 drives the zoom lens motor 3. A focusing lens motor

7 drives the focusing lens 104 of the zoom lens 1 to perform focusing, and a focusing lens drive unit 8 drives the focusing motor 7. A diaphragm mechanism 2 such as a diaphragm blade mechanism controls the amount of incident light, a diaphragm mechanism drive motor 5 drives the diaphragm mechanism 2, and a diaphragm mechanism drive unit 6 drives the diaphragm mechanism drive motor 5. An image sensing device 9 converts incident light to an electric signal. A CDS/AGC unit 10 performs automatic gain control (referred to as "AGC" below) for sampling the signal obtained from the conversion by the image sensing device 9 and amplifying the signal electrically. An analog-digital converter (referred to as an "A/D converter" below) 11 converts the analog signal output of the CDS/AGC unit 10 to a digital signal. A camera signal processor 12 generates a standard television signal by subjecting the signal from the A/D converter 11 to processing such as a gamma correction, color separation and color-difference matrix. A digital/analog converter (referred to as a "D/A converter" below) 13 converts the output signal of the camera signal processor 12 from a digital to an analog signal. A monitor 14 is for checking the video of the subject photographed by the photographer, an AE evaluation value processor 15 obtains an evaluation value, which is for exposure control, from the video signal produced by the camera signal processor 12, and an AF value evaluation processor 16 obtains an evaluation value, which is for

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performing focusing control, from the video signal produced by the camera signal processor 12. A microcomputer 19 executes the processing of an exposure controller for controlling exposure by controlling the diaphragm mechanism 5 2 and the gain of the CDS/AGC unit 10 and the processing of focus controller for focusing the image of the subject, which is formed on the surface of the image sensing device, by controlling the focusing lens 104.

The image sensing apparatus having the construction 10 described above is equipped with an image sensing assist mechanism that makes it possible to obtain the optimum medium video automatically or through a simple photographic operation. It should be noted that the term "automatic" is used here and in the claims to include the meaning of a 15 semiautomatic operation "to obtain the optimum medium video through a simple photographic operation". The image sensing assist mechanism includes an automatic exposure control unit (referred to as an "AE control unit" below) for automatically optimizing the constantly changing state of brightness of 20 the subject being photographed, and an auto-focus control unit (referred to as an "AF control unit" below) for automatically focusing on the subject. These units will be described next.

The AE control unit will be described first. 25 The AE control unit uses a known method for sensing exposure based upon the video signal representing the

subject, adjusting the amount of light incident upon the image sensing device 9 by the diaphragm mechanism 2 so as to optimize exposure, and controlling the gain of the video signal by the AGC means of the CDS/AGC unit 10 so that any  
5 change in brightness can be corrected for automatically.

The AE control in accordance with the arrangement of Fig. 16 is performed by the AE control unit of the microcomputer 19 in accordance with a control flowchart shown in Fig. 17.

10 Operation will now be described in accordance with the control flowchart of Fig. 17.

The AE evaluation value obtained by the AE evaluation value processor 15 is detected at step S901. The AE evaluation value is obtained by sensing, from the video  
15 signal produced by the camera signal processor 12, a change in the brightness of the subject. The AE evaluation value processor 15 senses exposure over the full area of the video, which impinges on the image sensing device 9, so as to optimize the exposure of the subject being photographed under  
20 a variety of photographic conditions.

Next, at step S902, the current state of exposure based upon the AE evaluation value detected at step S901 is compared with a reference value representing a preset exposure state considered to be optimum, it is determined whether the  
25 current state of exposure is optimum or not and, if exposure is improper, the amount of error with respect to the reference

value is detected. If the proper exposure has been attained ("YES" at step S902), the current exposure control value is output as is. If exposure is improper ("NO" at step S902), then the diaphragm mechanism 2 or CDS/AGC unit 11 is  
5 controlled in conformity with the amount of error and a control value that will cause the current state of exposure to become the reference value is calculated. This will be described taking as an example a case in which exposure control is carried out in accordance with the program diagram  
10 shown in Fig. 18.

Consider photography in sufficient illumination such as outdoors (area B in Fig. 18). If AGC is fixed at a low gain (0 dB in Fig. 18) at step S906 and the brightness of the subject changes, a control value by which the diaphragm  
15 mechanism 2 compensates for the amount of error detected at step S902 is calculated and the iris of the diaphragm mechanism 2 is opened or closed to regulate the amount of light that impinges upon the image sensing device 9, thereby controlling the state of exposure in optimum fashion. If  
20 the subject darkens, the diaphragm mechanism 2 is opened fully (area A in Fig. 18) and exposure control can no longer be performed by the diaphragm mechanism 2, then the diaphragm mechanism is fixed in the fully open state at step S904. If  
25 the brightness of the subject then changes, then a control value by which the amount of error detected at step S902 is compensated for by AGC gain is calculated and the state of

exposure is controlled for optimization by AGC gain.

The thus obtained control value of the diaphragm mechanism 2 or CDS/AGC unit 10 is output at step S907 to update the control value, whereby control for optimizing state of 5 exposure is performed while following up brightness of the subject at all times.

The AF control unit will be described next.

The AF control unit uses a known method for sensing the sharpness of the image of the subject from the video signal 10 and controlling the focusing lens position so as to maximize sharpness, thereby achieving focusing. In general, evaluation of sharpness is performed using the intensity of the high-frequency component of the video signal extracted from a bandpass filter or the blurring range detection 15 intensity of the video signal extracted by a differentiating circuit or the like. If the subject has been photographed, these signals usually are small if the subject is out of focus and increase as focusing improves, as illustrated in Fig. 19. The maximum value is attained when the subject is brought 20 into perfect focus. Accordingly, the focusing lens is controlled in such a manner that when the sharpness signal is small, the lens is moved rapidly in a direction that will enlarge the signal. As the signal increases, the lens is moved slowly and is halted precisely at the peak of the curve 25 to obtain a focused image. The method of automatic focusing generally is referred to as the hill climbing method

(referred as "hill-climbing AF" below).

Hill-climbing AF control in accordance with the arrangement of Fig. 16 will be described with reference to the control flowcharts of Fig. 20 through 23 the processing of which is performed by the AF control unit of the microcomputer 19.

The AF evaluation value is acquired from the AF value evaluation processor 16 at step S1201 in Fig. 20 and the currently prevailing AF mode is discriminated at step S1202.

10 In restart discrimination processing, a value held at transition to a restart discrimination mode is compared with the AF evaluation value at step S1301 in Fig. 21. If it is found at step S1302 that the difference between the held value and the AF evaluation value is greater than a predetermined value, a transition is made to direction discrimination processing. If the difference is larger than the predetermined value, then processing is terminated.

15 In direction discrimination processing, wobbling is performed at step S1401 in Fig. 22 to oscillate the focusing lens 104 back and forth, thereby determining whether the image is in or out of focus and, if out of focus, the direction in which the lens should be moved to obtain the focused state. If the image is out of focus, control returns to the hill-climbing processing mode at step S1406. If the image 20 is in focus, then control returns to the restart discrimination mode at step S1404.

In hill-climbing processing, the AF evaluation value is subjected to a peak holding operation at step S1501 in Fig. 23. Specifically, if the AF evaluation value is greater than the current peak value, then this value is adopted as

5 the new peak value. If it is greater than the focusing lens position, this value is adopted as the new peak value and this focusing lens position is held. Next, it is determined at step S1502 whether the AF evaluation value is greater than the initial hill-climbing value held at step S1407 in Fig.

10 22. Processing is terminated if the AF evaluation value is not less than the peak value. If the AF evaluation is less than the peak value, then processing for returning to the focusing lens position of the peak value is executed at step S1504 and then it is determined at step S1505 whether the

15 position has returned to the focusing ring position of the peak value. Control shifts to direction discrimination processing at step S1506 if the position has returned to the focusing ring position of the peak value; otherwise, processing is terminated. If it is found at step S1502 that

20 the AF evaluation value is less than the initial hill-climbing value, then the hill-climbing direction is reversed and the focusing lens is driven in the opposite direction. This is followed by step S1508, at which the initial hill-climbing value is updated to the current AF evaluation

25 value.

Thus, control is performed to move the focusing lens

and maximize the AF evaluation value while repeating restart discrimination processing, direction discrimination processing and hill-climbing processing, whereby video in which the subject is in focus at all times is obtained.

5        In an image sensing apparatus such as a video camera having a photography assist mechanism such as the AE control unit and AF control unit, the conventional practice is to use an electronic viewfinder (referred to as an "EVF" below), which enlarges the video of a small-size CRT or liquid crystal panel by an optical enlargement unit such as an enlarging lens, as a monitor for verifying the video being captured by the photographer. Typically, the photographer shoots a scene while observing video that appears in the EVF by way of a configuration in which the display screen of the EVF 10 is arranged to point in a direction opposite that of the lens, 15 as illustrated in Fig. 24A.

      An image sensing apparatus proposed in the recent past has a structure of the kind shown in Fig. 24B, in which the apparatus is provided with a monitor (referred to as a 20 "large-size monitor" below) that allows the photographer to verify video by direct viewing using a large-size liquid crystal panel without relying upon an optical enlargement unit, or of the kind shown in Fig. 24C, in which the apparatus is provided with both an EVF and a large-size monitor.

25        With the image sensing apparatus equipped with the large-size monitor, ordinarily photography is performed in

a state in which the display screen of the large-size monitor is faced in a direction opposite that in which light from the subject impinges upon the image sensing lens, as shown in Fig. 25A. However, unlike the EVF, the large-size monitor 5 allows the photographer to verify the video on the monitor even if the photographer does not look directly at the screen. Accordingly, there has been proposed a structure that makes possible so-called self-photography. Specifically, as shown in Fig. 25B, the display screen of the large-size monitor 10 is pointed in a direction the same as that in which light from the subject impinges upon the image sensing lens, thereby allowing the photographer to shoot video of himself or herself while observing the image on the large-size monitor, as illustrated in Fig. 26.

15 When self-photography is performed, AE, AF control that follows up the subject is performed by the AE control unit and AF control unit in the same manner as when ordinary photography is carried out, thereby providing the optimum video.

20 Control of the photography assist mechanism such as the  
AE control unit and AF control unit is control premised on  
the photographic conditions that prevail during ordinary  
photography. In self-photography, however, proper control  
is not always performed because the photographic conditions  
25 differ from those of ordinary photography.

For example, at the time of ordinary photography, the

AE control unit achieves a certain degree of optimization in a variety of brightness conditions by taking into consideration not only scenes in which the entire picture has a uniform brightness but also back lighted scenes and scenes illuminated by spotlight, and control is performed quickly in response to a change in the brightness of the subject. With self-photography, however, the photographer shoots video of himself or herself while observing the video on the large-size monitor. Consequently, there is little change in the brightness of the main subject. When AE control similar to that at the time of ordinary photograph is performed, the camera reacts too sensitively to changes in the brightness of peripheral subjects, thereby causing a change in the brightness of the main subject.

In regard to the AF control unit, control at the time of ordinary photography is carried out so as to achieve focusing from close-up photography, in which the distance to the subject is less than one meter, to photography in which the subject distance is near infinity, as in the case of a landscape. In a case where a nearby subject is present within an AF photometry area used to detect the AF evaluation value, the camera will focus on the main subject if the main subject is photographed predominantly at the center of the screen, as shown in Fig. 15A. However, if the camera is erroneously focused on the background in a case where the main subject has shifted from the center of the screen because of hand

movement of the photographer or temporary movement of the main subject at the time of photography, as shown in Fig. 15B, the main subject at the time of self-photography will become much more blurred than at the time of ordinary photography because the distance to the main subject is approximately one meter.

Thus, when control of the photography assist mechanism such as the AE and AF units for dealing with a wide range of photographic conditions is performed in the same manner as at the time of ordinary photography when self-photography is carried out using an image sensing apparatus having a large-size monitor, often the video obtained is not that intended by the photographer.

## 15 SUMMARY OF THE INVENTION

The present invention has been devised in view of these circumstances and a first object thereof is to provide an image sensing apparatus in which the optimum video can be obtained not only at the time of ordinary photography but also at the time of self-photography.

According to the present invention, the foregoing object is attained by providing an image sensing apparatus having a construction in accordance with (1) through (5) below.

(1) There is provided an image sensing apparatus having

a lens for forming an image of a subject, a monitor in which direction of a display can be changed relative to a direction in which light from the subject impinges upon the lens, and a photography assist mechanism for adjusting photographic 5 conditions automatically, wherein at the time of self-photography, in which the direction in which light impinges upon the lens and the display direction of the monitor agree, the photography assist mechanism is capable of performing control different from that at the time of other, ordinary 10 photography.

(2) The photography assist mechanism has automatic exposure control means which, at the time of self-photography, performs control by a photometry method different from that at the time of ordinary photography.

15 (3) At the time of self-photography, the automatic exposure control means makes response slower than that at the time of ordinary photography.

(4) The photography assist mechanism has automatic focus control means which, at the time of self-photography, 20 performs control through a sequence different from that at the time of ordinary photography.

(5) At the time of self-photography, the automatic focus control means makes response slower than that at the time of ordinary photography.

25 A second object of the present invention is to rapidly obtain an optimum image, even by self-photography using an

image sensing apparatus having a zoom function, by executing appropriate processing to implement self-photography, this being accomplished without complicating the operation performed by the photographer.

5       According to the present invention, the second object is attained by providing an image sensing apparatus having an image sensing device for sensing the image of a subject, a zoom lens for deciding magnification of a sensed image, and a focusing lens for deciding focal point position of the  
10      subject whose image is sensed by the image sensing device, the apparatus comprising display means capable of displaying the image sensed by the image sensing device, moving means for moving display direction of the display means to a direction on the side of the subject, sensing means for  
15      sensing that the display direction of an image on the display means is being moved to the side of the subject by the moving means, and control means which, if the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, controls  
20      the sensed-image magnification of the zoom lens to a wide-angle magnification and controls distance to the subject, which is controlled by the focusing lens, to a short distance in front of the image sensing apparatus.

Further, the control means controls the sensed-image  
25      magnification of the zoom lens to the wide-angle limit or to a point near the wide-angle limit, and controls distance

to the subject, which is controlled by the focusing lens, to a short-distance limit in front of the image sensing apparatus or to a point near the short-distance limit.

The apparatus further comprises magnification setting means for setting the sensed-image magnification controlled by the control means, and subject-distance setting means for setting a subject distance at which the focusing lens, which is controlled by the control means, is brought into focus.

The apparatus further comprises recording means for recording an image based upon an image signal indicative of an image sensed by the image sensing device, and control inhibiting means for inhibiting control by the control means if an image is being recorded by the recording means.

The apparatus further comprises memory means for  
15 storing the sensed-image magnification controlled by the  
zoom lens, as well as the subject distance controlled by the  
focusing lens, when the sensing means has sensed that the  
display direction of the image on the display means is being  
moved to the side of the subject, wherein when the sensing  
20 means no longer senses that the display direction of the image  
on the display means is being moved to the side of the subject,  
the control means controls the zoom lens to the sensed-image  
magnification that has been stored by the memory means and  
controls the focusing lens to the subject distance that has  
25 been stored by the memory means.

The present invention further provides an image sensing

apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for deciding magnification of a sensed image, the apparatus comprising display means capable of displaying the image sensed by the image sensing 5 device, moving means for moving display direction of the display means to a direction on the side of the subject, sensing means for sensing that the display direction of the image on the display means is being moved to the side of the subject by the moving means, and control means which, if the 10 sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, controls the image magnification of the zoom lens to a wide-angle magnification.

The control means controls the sensed-image 15 magnification of the zoom lens to the wide-angle limit or to a point near the wide-angle limit.

The apparatus further comprises magnification setting means for setting the sensed-image magnification controlled by the control means.

20 The apparatus further comprises memory means for storing the sensed-image magnification controlled by the zoom lens when the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, wherein when the sensing means 25 no longer senses that the display direction of the image on the display means is being moved to the side of the subject,

the control means controls the zoom lens to the sensed-image magnification that has been stored by the memory means.

The present invention further provides an image sensing apparatus having an image sensing device for sensing the image of a subject, and a focusing lens for deciding focal point position of the subject whose image is sensed by the image sensing device, the apparatus comprising display means capable of displaying the image sensed by the image sensing device, moving means for moving display direction of the display means to a direction on the side of the subject, sensing means for sensing that the display direction of the image on the display means is being moved to the side of the subject by the moving means, and control means which, if the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, controls distance to the subject, which is controlled by the focusing lens, to a short distance in front of the image sensing apparatus.

Further, the control means controls distance to the subject, which is controlled by the focusing lens, to a short-distance limit in front of the image sensing apparatus or to a point near the short-distance limit.

The apparatus further comprises subject-distance setting means for setting a subject distance controlled by the focusing lens, which is controlled by the control means.

The apparatus further comprises memory means for

storing the subject distance controlled by the focusing lens when the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, wherein when the sensing means no longer 5 senses that the display direction of the image on the display means is being moved to the side of the subject, the control means controls the focusing lens to the subject distance that has been stored by the memory means.

The apparatus further comprises automatic focusing means for executing automatic focusing after the focusing lens has been controlled by the control means.

The subject-distance setting means is capable of setting a subject distance within a range of 10 cm to 1 m.

15 The present invention further provides an image sensing apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for deciding magnification of a sensed image, the apparatus comprising display means capable of displaying the image sensed by the image sensing device, moving means for moving display direction of the display means to a direction on the side of the subject, sensing means for sensing that the display direction of the image on the display means is being moved to the side of the subject by the moving means, memory means for storing the sensed-image magnification controlled by the zoom lens, as  
20 well as the subject distance controlled by the focusing lens,  
25

when the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, and control means for controlling the zoom lens to the sensed-image magnification that has been stored

5 by the memory means and the focusing lens to the subject distance that has been stored by the memory means when the sensing means no longer senses that the display direction of the image on the display means is being moved to the side of the subject.

10 The present invention further provides an image sensing apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for deciding magnification of a sensed image, the apparatus comprising display means capable of displaying the image sensed by the image sensing

15 device, moving means for moving display direction of the display means to a direction on the side of the subject, sensing means for sensing that the display direction of the image on the display means is being moved to the side of the subject by the moving means, memory means for storing the

20 sensed-image magnification controlled by the zoom lens when the sensing means has sensed that the display direction of the image on the display means is being moved to the side of the subject, and control means for controlling the zoom lens to the sensed-image magnification that has been stored

25 by the memory means when the sensing means no longer senses that the display direction of the image on the display means

is being moved to the side of the subject.

The present invention further provides an image sensing apparatus having an image sensing device for sensing the image of a subject, and a focusing lens for deciding focal

5 point position of the subject whose image is sensed by the image sensing device, the apparatus comprising display means capable of displaying the image sensed by the image sensing device, moving means for moving display direction of the display means to a direction on the side of the subject,

10 sensing means for sensing that the display direction of the image on the display means is being moved to the side of the subject by the moving means, memory means for storing the subject distance controlled by the focusing lens when the sensing means has sensed that the display direction of the

15 image on the display means is being moved to the side of the subject, and control means for controlling the focusing lens to the subject distance that has been stored by the memory means when the sensing means no longer senses that the display direction of the image on the display means is being moved

20 to the side of the subject.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts

25 throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram illustrating the construction of an image sensing apparatus according to a first embodiment 5 of the present invention;

Fig. 2 is a flowchart of AE control in the image sensing apparatus according to the first embodiment;

Figs. 3A and 3B are diagrams showing an example of photometry for sensing AE evaluation values in ordinary 10 photography and self-photography;

Figs. 4A and 4B are diagrams showing an example of photometry for sensing AE evaluation values in ordinary photography and self-photography when a screen is split into areas;

15 Fig. 5 is a control flowchart of hill-climbing processing in an image sensing apparatus according to a second embodiment of the present invention;

Fig. 6 is a graph useful in describing self-photography according to the second embodiment;

20 Fig. 7 is a block diagram illustrating the construction of an image sensing apparatus according to a third embodiment of the present invention;

Fig. 8 is a perspective view illustrating the image sensing apparatus according to the third embodiment;

25 Fig. 9A is a side view of the image sensing apparatus when it is used for ordinary photography;

Fig. 9B is a side view of the image sensing apparatus when it is used for self-photography;

Fig. 10 is flowchart of processing executed when the image sensing apparatus of the third embodiment is used for  
5 self-photography;

Fig. 11 is flowchart of another example of processing executed when the image sensing apparatus of the third embodiment is used for self-photography;

10 Fig. 12 is flowchart of another example of processing executed when the image sensing apparatus of the third embodiment is used for self-photography;

Fig. 13 is flowchart of another example of processing executed when the image sensing apparatus of the third embodiment is used for self-photography;

15 Fig. 14 is a flowchart of processing executed when the image sensing apparatus of the third embodiment is restored to ordinary photography;

Figs. 15A and 15B are diagrams useful in describing self-photography;

20 Fig. 16 is a block diagram illustrating the construction of an image sensing apparatus according to the prior art;

Fig. 17 is a flowchart of AE control in the image sensing apparatus according to the prior art;

25 Fig. 18 is a program diagram of AE control in the image sensing apparatus according to the prior art;

Fig. 19 is a graph useful in describing AF control in

the image sensing apparatus according to the prior art;

Fig. 20 is a flowchart of AF control in the image sensing apparatus according to the prior art;

Fig. 21 is a control flowchart of AF restart processing  
5 in the image sensing apparatus according to the prior art;

Fig. 22 is a control flowchart of direction discrimination processing in the image sensing apparatus according to the prior art;

Fig. 23 is a control flowchart of hill-climbing  
10 processing in the image sensing apparatus according to the prior art;

Figs. 24A - 24C are diagrams useful in describing an image sensing apparatus having an electronic viewfinder and a large-size monitor;

15 Figs. 25A, 25B are diagrams useful in describing ordinary photography and self-photography; and

Fig. 26 is a diagram useful in describing self-photography.

## 20 DESCRIPTION OF THE PREFERRED EMBODIMENTS

The image sensing apparatus of the present invention will now be described in detail in accordance with preferred embodiments thereof.

25 The embodiments of the image sensing apparatus are equipped with a large-size monitor. However, in case of an

arrangement that performs automatic focusing or an arrangement using an image sensing lens having a fixed focal point, the state of focusing need not be checked on the monitor and only the position of the subject need be confirmed

5 when self-photography is performed. Accordingly, the invention can also be practiced in a form having a small monitor. Further, though the embodiments are for taking moving pictures, this does not impose a limitation upon the invention, which can also be practiced in a form that takes

10 still pictures.

(First Embodiment)

Fig. 1 is a block diagram illustrating the construction of an image sensing apparatus according to a first embodiment of the present invention. Components identified by reference characters identical with those of the prior art shown in Fig. 16 have the same functions and the processing of a video signals is performed in similar fashion. This embodiment is additionally provided with a photographic mode changeover unit 18 such as switch means for changing over between ordinary photography and self-photography, and AE control performed by a microcomputer 17 (which includes a CPU, ROM and RAM) is further provided with an AE control function for self-photography. Though this arrangement is premised on a structure in which the lens unit is movable relative to

15 the apparatus body having a fixed monitor, as illustrated in Fig. 26, this does not impose a limitation on the invention

20

25

and the embodiment can also be practiced in a form in which the monitor is movable relative to the apparatus body having a fixed lens unit.

In self-photography, the photographer generally 5 performs photography at such a distance that he or she can confirm the image appearing on the large-size liquid crystal monitor. This means that the photographer holds the apparatus when shooting or places the apparatus at a suitable location at a total distance of one to two meters to perform 10 photography. As a consequence, the photographic conditions are more limited than when ordinary photography is performed. AE control according to this embodiment is performed in conformity with the above-mentioned photographic conditions that prevail when self-photography is performed, as well as 15 in conformity with ordinary photographic conditions.

Operation in accordance with AE control in this embodiment will be described with reference to the control flowchart of Fig. 2 executed by the microcomputer 17. It should be noted that the program corresponding to this 20 control flowchart is stored in the ROM or RAM and is executed by the CPU. The program may be executed upon being loaded into the RAM from an external storage medium 19 such as floppy disk or CD-ROM.

Based upon a detection signal from the photographic mode 25 changeover means 18, it is determined at step S201 whether the prevailing mode is the ordinary photography mode or the

self-photography mode. Control proceeds to detection of AE evaluation value at step S202 if the mode is ordinary photography and to detection of AE evaluation value at step S203 if the mode is self-photography. The detection of the 5 AE evaluation values at steps S202, S203 involves sensing a change in the brightness of the subject based upon the video signal from the camera signal processor 12. Detection of the AE evaluation value at the time of ordinary photography at step S202 generally involves photometering of subject 10 brightness over the full screen area, as shown in Fig. 3A. However, detection of the AE evaluation value at the time of self-photography at step S203 mainly involves cases in which the face of the photographer is shot near the center 15 of the screen. Accordingly, only the area at the central portion of the screen is subjected to photometering, as shown in Fig. 3B, to thereby detect the AE evaluation value. In a case where the metered area is split into a plurality of areas and the AE evaluation value of the overall screen is calculated while weighting the AE evaluation values of the 20 respective areas, the weighting of the areas at the time of self-photography is such that the AE evaluation values at the central portion are weighted more than in the case of ordinary photography (Fig. 4A), as shown in Fig. 4B, as a result of which the detection of AE evaluation values is 25 performed in such a manner that the influence of subject brightness at peripheral portions is made less in the case

of self-photography than in the case of ordinary photography.

Upon this detection of the AE evaluation value, the program proceeds to step S204 as in the prior art. Here exposure is controlled by controlling the diaphragm mechanism and AGC unit in accordance with the program diagram of Fig. 18.

When self-photography is performed, AE control is carried out while performing photometering with greater emphasis on the central portion of the screen than in the case of ordinary photography, as mentioned above. Consequently, even if a spot-lighted subject appears at the periphery, the main subject is not influence and is maintained at the optimum exposure.

Besides changing the AE photometering, control may be performed to change the amount of control of the diaphragm mechanism and of AGC gain with respect to a change in subject brightness at steps S206 and S208 in Fig. 2 in such a manner that AE control response is made slower than in the case of ordinary photography. As a result, even if the main subject has shifted from the center of the screen because of hand movement of the photographer or temporary movement of the main subject at the time of self-photography, there is no sudden change in state of exposure and video in which the state of exposure of the main subject is stable is obtained.

25 (Second Embodiment)

AF control at the time of self-photography in this

embodiment is performed in a manner different from that of the prior art.

The hardware configuration is the same as that of the first embodiment but AF control performed by the 5 microcomputer 17 is further provided with an AF control function for self-photography.

In the first embodiment, photographic conditions for self-photography are more limited than in the case of ordinary photography. In particular, distance between the 10 image sensing apparatus and the subject is limited to about one meter in case of self-photography, whereas the distance is several centimeters to infinity in case of ordinary photography. In the second embodiment, the AF control unit performs control in conformity with the above-mentioned 15 photographic conditions for self-photography, as well as in conformity with ordinary photographic conditions.

The operation of AF control according to this embodiment will now be described.

First, an AF evaluation value is acquired from the AF 20 value evaluation processor 16 at step S1201 in Fig. 20 in the same manner as in the prior art. The currently prevailing AF mode is discriminated at step S1202. If the prevailing mode is the restart discrimination mode or direction discrimination mode, processing similar to that of the prior 25 art is executed. If the prevailing mode is the hill-climbing mode, then processing is executed in accordance with the

control flowchart of Fig. 5, to which processing for dealing with self-photography has been added.

Hill-climbing processing for AF control according to this embodiment will now be described based upon the control flowchart of Fig. 5.

First, it is determined at step S501 whether the prevailing mode is the ordinary photography mode or the self-photography mode. In case of the ordinary photography mode, the program proceeds to step S503 and processing similar to that of the prior art is executed (see Fig. 23). In case of the self-photography mode, the program proceeds to step S502. Here the current focusing lens position is detected and it is determined whether the current focusing lens position lies inside or outside a preset lens control range. The full range from near to infinity is adopted as the controllable range in case of ordinary photography, as shown in Fig. 19. In the case of self-photography, on the other hand, the distance to the subject is more limited. Accordingly, the lens control range is limited to the close-up region of approximately one meter, as illustrated in Fig. 6. If the current focusing lens position lies within the lens control range of Fig. 6, the program proceeds to step S503, where hill-climbing control similar to that of the prior art is continued. If the current focusing lens position exceeds the lens control range, however, processing for hill-climbing control is terminated, even if the AF

evaluation value is smaller than the peak value, and operation shifts to the direction discrimination mode.

By thus achieving the focused state only at a focusing lens position in the lens control range of Fig. 6 at the time 5 of self-photography, the focusing lens position will not be controlled up to a focusing position that results in a highly defocused state, as shown in Fig. 6, even if the main subject has shifted from the center of the screen because of hand movement of the photographer or temporary movement of the 10 subject at the time of self-photography, as illustrated in Fig. 15B. As a consequence, the main subject will not appear greatly out of focus. In addition, since the lens control range is narrow, focusing control is performed more quickly.

More stable video can be obtained in this embodiment 15 as well by slowing down the response of AF control.

In each of the foregoing embodiments the photographic mode changeover unit is externally provided. However, this does not impose a limitation upon the invention. An arrangement may be adopted in which the mode changes over 20 from ordinary photography to self-photography internally when the image sensing lens has been brought to the position of self-photography. Further, the state in which the light-impinging direction of the lens and the display direction of the monitor agree is adopted as the self- 25 photography state. However, since the monitor can be viewed obliquely as well, the self-photography state covers a

situation in which the two directions are not in perfect agreement but in substantial agreement to a degree that makes self-photography possible.

Thus, in accordance with the embodiments set forth 5 above, optimum video can be obtained not only for ordinary photography but for self-photography as well.

Though the first and second embodiments have been described independently, an image sensing apparatus having the functions of both the first and second embodiments would 10 provide the same effects. Further, by combining the functions of the third embodiment (described below) in various ways with those of the first and second embodiments, an image sensing apparatus capable of performing self-photography in more ideal fashion can be obtained.

15 (Third Embodiment)

The third embodiment is adapted to avoid the following difficulty: In self-photography, the photographer points the image sensing apparatus at himself or herself to perform 20 photography while supporting the apparatus by his or her own arms. Consequently, if photography is performed in a state in which the zoom lens has been set to the telephoto side, only a part of the photographer's body will be captured. To prevent this, the photographer must manipulate a zoom lever 25 to move the zoom lens to the wide-angle side before photography can be carried out.

Fig. 7 is a block diagram showing the construction of

the image sensing apparatus according to this embodiment. Though the basic construction of this embodiment resembles that of the first and second embodiments, AE control is omitted in this embodiment in order to avoid complexity.

5       As shown in Fig. 7, a camera unit 2010 has a lens unit 2001 equipped with a zoom lens 2001a for adjusting magnification of the sensed image and a focusing lens 2001b for adjusting focal point, an image sensing device 2002 for converting the optical image, which has been obtained via  
10      the lens unit 2001, to the image of the subject, and a lens drive circuit 2003.

The lens drive circuit 2003 drives the zoom lens 2001a and the focusing lens 2001b by a command from a microcomputer 2006 (described later) that includes a CPU, a ROM and a RAM.

15       A recorder unit 2011 includes a video signal processing circuit 2005 for converting the signal obtained by the image sensing device 2002 to a standardized video signal such as an NTSC signal. In a case where the microcomputer 2006 gives notification of the fact that self-photography is being  
20      performed, the video signal processing circuit 2005 executes processing to turn the output image upside down. The recorder unit 2011 further includes a self-photography detection switch 2007 for sensing whether the display of an LCD 2008 is pointing toward the subject.

25       The recorder unit 2011 further includes a playback unit 2004 that stores the video signal output by the video signal

processing circuit 2005 on a recording medium such as magnetic tape. The microcomputer 2006, which is constituted by the aforementioned CPU and memories, controls the overall image sensing apparatus. Further, the microcomputer 2006

5       functions as control means which, in dependence upon the output signal from the self-photography detection switch 2007, controls the zoom lens and focusing lens to a prescribed wide-angle position or close-up position.

An AF circuit 2017 extracts from the video signal a

10      signal component, such as a high-frequency component, that varies depending upon the focusing state of the lens, thereby detected the state of focusing. A focus signal that has been detected by the AF circuit 2017 is supplied to the microcomputer 2006. The latter calculates a focusing lens

15      control value and supplies the value to the lens drive circuit 2003, whereby focusing is executed.

A display unit 2012 includes an LCD 2008 for displaying an image currently being captured or an image reproduced by the playback unit 2004. An LCD drive circuit 2009 outputs

20      an image to the LCD 2008 based upon the video signal output by the video signal processing circuit 2005.

Zoom switches 2014a, 2014b control the magnification of the sensed image by the zoom lens 2001a in the telephoto and wide-angle directions, respectively. A dial 2015 sets

25      the subject distance of the focusing lens 2001b to a prescribed close-up side (the close-up limit or a point near

this limit) controlled over a range of about 10 cm to 1 m at the time of self-photography. If the dial 2015 is turned clockwise, the setting can be changed gradually to longer distances. Turning the dial 2015 counter-clockwise allows 5 the setting to be changed gradually to the close-up position.

A setting switch 2016 is a button that sets the sensed-image magnification and subject distance obtained as a result of the operator manipulating the zoom switches 2014a, 20145 and dial 2015. When the setting switch 2016 10 is turned ON (pressed), the current sensed-image magnification and subject distance resulting from the operation performed by the operator are stored in the RAM provided in the microcomputer 2006.

In self-photography, it is believed adequate to set the 15 magnification of the sensed image to the wide-angle limit or to a point near this limit, and to set the subject distance to a point on the close-up side, i.e., to 10 cm - 1 m.

In this embodiment, the dial 2015 and the setting switch 2016 are also referred to collectively as a subject distance 20 setting unit, and the zoom switches 2014a, 2014b is also referred to collectively as a sensed-image magnification setting unit.

Fig. 8 is a perspective view of the image sensing apparatus according to this embodiment, Fig. 9A is a side 25 view of the apparatus when it is used for ordinary photography, and Fig. 9B is a side view of the apparatus when

it is used for self-photography.

A hinge 2013 in Fig. 8 connects the recorder unit 2011 (the main body of the image sensing apparatus) and the display unit 2012 together. The display unit 2012 is capable of being 5 turned to face the subject (i.e., in the direction in which the image is sensed). In Fig. 9A the display screen of the display unit 2012 is facing in the direction (arrow A) opposite that in which the image is sensed. In Fig. 9B, on the other hand, the display screen of the display unit 2012 10 is facing in the same direction (arrow B) as that in which the image is sensed. This makes it possible for the photographer to become the subject and verify his or her image during photography. The self-photography detection switch 2007 is pressed for self-photography, whereby a command 15 indicative of the self-photography mode is sent to the microcomputer 2006 (Fig. 7).

The operation of the image sensing apparatus in a case where self-photography is performed according to this embodiment will now be described in accordance with the 20 control flowchart of Fig. 10. As in the first and second embodiments, a program corresponding to the control flowchart for this operation is stored in the ROM or RAM and executed by the CPU, though the program may be executed upon being loaded into the RAM from an external storage medium 25 2017.

If the image sensing apparatus is in the state shown

in Fig. 9B and the display screen of the display unit 2012 is facing the subject, the self-photography detection switch 2007 turns ON at step S2101 in Fig. 10 and the microcomputer 2006 is notified of the fact that self-photography is capable 5 of being executed.

Upon being notified of the fact that the self-photography detection switch 2007 is ON, the microcomputer 2006 saves the last zoom magnification and subject distance that prevailed at the time of ordinary photography in the 10 RAM at step S2101a and, at step S2102, instructs the video signal processing circuit 2005 to execute processing for turning the image upside down. In response, the video signal processing circuit 2005 converts the signal obtained by the image sensing device 2002 to a standardized signal such as 15 an NTSC signal and outputs the signal to the playback unit 2004. The signal representing the image obtained by the processing for turning the image upside down is output to the LCD drive circuit 2009.

Next, at step S2103, the sensed-image magnification and 20 the subject distance for self-photography, which have been set beforehand by the setting switch 2016, etc. and stored in the RAM of the microcomputer 2006, are read out of the RAM by the microcomputer 2006 which, on the basis thereof, instructs the lens drive circuit 2003 to drive the lens unit 25 2001. The lens drive circuit 2003 responds to the instruction by controlling the magnification of the zoom lens 2001a to

the wide-angle limit or to point near this limit, and by controlling the focal-point position of the focusing lens 2001b to the close-up limit or to a point near this limit.

Following the completion of the processing at step 5 S2103, the microcomputer 2006 executes AF control at step S2104 by sensing the peak of the high-frequency component of the video signal from the video signal processing circuit 2005.

Thus, by sensing that the display on the LCD 2008 is 10 facing in a direction the same as the image sensing direction and that self-photography is possible in the manner described above, the magnification of the sensed image is set to the vicinity of the wide-angle limit and the focal-point position is controlled to the close-up side based upon the information 15 that has been set in advance, thereby making possible self-photography in which an appropriate image is obtained.

Though the zoom lens 2001a and focusing lens 2001b are driven for self-photography in the flowchart of Fig. 10, it will suffice if either one of these lenses is driven.

20 Fig. 11 is a flowchart of processing executed when only the zoom lens 2001a is driven. When the self-photography detection switch 2007 is found to be ON, the zoom lens 2001a is controlled to the vicinity of the wide-angle limit at step S2103a. Other aspects of the construction and operation of 25 the image sensing apparatus are as set forth in the above-described embodiment and need not be described again.

Fig. 12 is a flowchart of processing executed when only the focusing lens 2001b is driven. When the self-photography detection switch 2007 is found to be ON, the focusing lens 2001b is controlled so as to focus on the close-up side at 5 step S2103b. Other aspects of the construction and operation of the image sensing apparatus are as set forth in the above-described embodiment and need not be described again.

Fig. 14 is a flowchart of processing showing the 10 operation of the image sensing apparatus when the image sensing apparatus is restored from the self-photography state to the ordinary photography state.

If the microcomputer 2006 finds that the self-photography detection switch 2007 is OFF and, hence, that the image sensing apparatus is in the state for ordinary 15 photography at step S2201, the microcomputer 2006 instructs the video signal processing circuit 2005 to halt the processing (step S2202) that turns the image obtained from the image sensing device 2002 upside down before outputting it to the LCD drive circuit 2009. Instead, the microcomputer 20 2006 executes ordinary read-out processing.

This is followed by step S2203, at which the microcomputer 2006 calls information concerning lens parameters that relate to the sensed-image magnification and distance from the focusing lens to the subject that prevailed 25 just before the self-photography detection switch 2007 turned ON, these parameters having been stored in the RAM

at step S2101a.

Next, at step S2204, and on the basis of the information that has been called, the playback unit 2004 outputs a command to the lens drive circuit 2003 so as to drive the zoom lens 5 2001a and the focusing lens 2001b, thereby driving the lens 2001a and the focusing lens 2001b.

By executing processing in this fashion, it is possible to restore the magnification of the sensed image and the focal-point position that prevailed prior to execution of 10 self-photography, thereby making possible smooth photography from self-photography to ordinary photography.

In a case where the photographer performs self-photography, it is necessary for the attitude of the main body of the image sensing apparatus to be changed from that 15 of the ordinary photography state. When the display screen of the display unit 2012 is moved to face in the image sensing direction, the shooting of video usually is halted temporarily. Further, if the display unit 2012 is moved during shooting, the lens unit 2001 is driven into motion, 20 thereby causing the shooting of unexpectedly poor video. To prevent this, it will suffice for the microcomputer to execute processing that inhibits control of the lens unit even if the self-photography detection switch 2007 is turned ON during shooting (during the recording of the sensed image 25 by the playback unit 2004).

Fig. 13 is a flowchart of processing for inhibiting zoom

control in the image sensing apparatus in a case where it is sensed that the self-photography detection switch 2007 is ON during shooting.

When the self-photography detection switch 2007 is 5 found to be ON at step S2101 in the flowchart of Fig. 13, it is determined at step S2101b whether the image sensing apparatus is currently recording a sensed image by means of the playback unit 2004. If recording is not in progress, processing from step S2101a onward is executed in the manner 10 described above. If recording of an image is in progress, then control applied to the lens unit 2001 is inhibited. The control inhibiting means in this case corresponds to the microcomputer 2006.

If the above-described processing is executed, zoom 15 control of the lens unit when self-photography is in effect will not be executed while the shooting of video is in progress.

Thus, in accordance with this embodiment as described above, the zoom lens is controlled to the vicinity of the 20 wide-angle limit and the focusing lens is controlled to focus on the close-up side of the image sensing apparatus in a case where the LCD display screen is pointed in a direction the same as the image sensing direction at the time of self-photography. This makes it possible to execute appropriate 25 shooting of video promptly at the time of self-photography.

The present invention can be applied to a system

constituted by a plurality of devices or to an apparatus comprising a single device.

Further, it goes without saying that the object of the present invention can also be achieved by providing a storage 5 medium storing the program codes of the software for performing the aforesaid functions of the foregoing embodiments to a system or an apparatus, reading the program codes with a computer (e.g., a CPU or MPU) of the system or apparatus from the storage medium, and then executing the 10 program.

In this case, the program codes read from the storage medium implement the novel functions of the invention, and the storage medium storing the program codes constitutes the invention.

15 Further, the storage medium, such as a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, CD-R, magnetic tape, non-volatile type memory card or ROM can be used to provide the program codes.

Furthermore, besides the case where the aforesaid 20 functions according to the embodiments are implemented by executing the program codes read by a computer, the present invention covers a case where an operating system or the like working on the computer performs a part of or the entire process in accordance with the designation of program codes 25 and implements the functions according to the embodiment.

Furthermore, the present invention further covers a

case where, after the program codes read from the storage medium are written in a function extension board inserted into the computer or in a memory provided in a function extension unit connected to the computer, a CPU or the like 5 contained in the function extension board or function extension unit performs a part of or the entire process in accordance with the designation of program codes and implements the function of the above embodiments.

In a case where the present invention is applied to the 10 above-described storage medium, the program codes for executing the processing that corresponds to the flowcharts described earlier would be stored on the recording medium.

As many apparently widely different embodiments of the present invention can be made without departing from the 15 spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

WHAT IS CLAIMED IS:

1. An image sensing apparatus having a lens for forming an image of a subject, a monitor in which direction of a display can be changed relative to a direction in which light from the subject impinges upon the lens, and a photography assist mechanism for adjusting photographic conditions automatically, wherein at the time of self-photography, in which the direction in which light impinges upon the lens and the display direction of the monitor agree, said 5 photography assist mechanism is capable of performing control different from that at the time of other, ordinary 10 photography.
2. The apparatus according to claim 1, wherein said photography assist mechanism has automatic exposure control 15 means which, at the time of self-photography, performs control by a photometry method different from that at the time of ordinary photography.
3. The apparatus according to claim 2, wherein at the time of self-photography, said automatic exposure control means 20 makes response slower than that at the time of ordinary photography.
4. The apparatus according to claim 1, wherein said photography assist mechanism has automatic focus control means which, at the time of self-photography, performs 25 control through a sequence different from that at the time of ordinary photography.

5. The apparatus according to claim 4, wherein at the time of self-photography, said automatic focus control means makes response slower than that at the time of ordinary photography.

5 6. An image sensing apparatus having an image sensing device for sensing the image of a subject, a zoom lens for deciding magnification of a sensed image, and a focusing lens for deciding focal point position of the subject whose image is sensed by the image sensing device, said apparatus  
10 comprising:

display means capable of displaying the image sensed by the image sensing device;

moving means for moving display direction of said display means to a direction on the side of the subject;

15 sensing means for sensing that the display direction of an image on said display means is being moved to the side of the subject by said moving means; and

control means which, if said sensing means has sensed that the display direction of the image on said display means  
20 is being moved to the side of the subject, controls the sensed-image magnification of the zoom lens to a wide-angle magnification and controls distance to the subject, which is controlled by the focusing lens, to a short distance in front of the image sensing apparatus.

25 7. The apparatus according to claim 6, wherein said control means controls the sensed-image magnification of the zoom

lens to a wide-angle limit or to a point near the wide-angle limit, and controls distance to the subject, which is controlled by the focusing lens, to a short-distance limit in front of the image sensing apparatus or to a point near 5 the short-distance limit.

8. The apparatus according to claim 6, further comprising:

    magnification setting means for setting said sensed-image magnification controlled by said control means; and

10       subject-distance setting means for setting a subject distance at which the focusing lens, which is controlled by said control means, is brought into focus.

9. The apparatus according to claim 6, further comprising:

    recording means for recording an image based upon an 15 image signal indicative of an image sensed by said image sensing device, and

    control inhibiting means for inhibiting control by said control means if an image is being recorded by said recording means.

20 10. The apparatus according to claim 6, further comprising:

    memory means for storing the sensed-image magnification controlled by the zoom lens, as well as the subject distance controlled by the focusing lens, when said sensing means has sensed that the display direction of the 25 image on said display means is being moved to the side of the subject,;

wherein when said sensing means no longer senses that the display direction of the image on said display means is being moved to the side of the subject, said control means controls the zoom lens to the sensed-image magnification that

5 has been stored by said memory means and controls the focusing lens to the subject distance that has been stored by said memory means.

11. An image sensing apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for

10 deciding magnification of a sensed image, said apparatus comprising:

display means capable of displaying the image sensed by said image sensing device;

15 moving means for moving display direction of said display means to a direction on the side of the subject;

sensing means for sensing that the display direction of the image on said display means is being moved to the side of the subject by said moving means; and

20 control means which, if said sensing means has sensed that the display direction of the image on said display means is being moved to the side of the subject, controls the image magnification of the zoom lens to a wide-angle magnification.

12. The apparatus according to claim 11, wherein said control means controls the sensed-image magnification of the zoom

25 lens to the wide-angle limit or to a point near the wide-angle limit.

13. The apparatus according to claim 11, further comprising magnification setting means for setting the sensed-image magnification controlled by said control means.

14. The apparatus according to claim 11, further comprising 5 memory means for storing the sensed-image magnification controlled by the zoom lens when said sensing means has sensed that the display direction of the image on said display means is being moved to the side of the subject, wherein when said sensing means no longer senses that the display direction 10 of the image on said display means is being moved to the side of the subject, said control means controls the zoom lens to the sensed-image magnification that has been stored by said memory means.

15. An image sensing apparatus having an image sensing device 15 for sensing the image of a subject, and a focusing lens for deciding focal point position of the subject whose image is sensed by the image sensing device, said apparatus comprising:

display means capable of displaying the image sensed 20 by said image sensing device;

moving means for moving display direction of the display means to a direction on the side of the subject;

sensing means for sensing that the display direction of the image on said display means is being moved to the side 25 of the subject by said moving means; and

control means which, if said sensing means has sensed

that the display direction of the image on said display means is being moved to the side of the subject, controls distance to the subject, which is controlled by the focusing lens, to a short distance in front of the image sensing apparatus.

5 16. The apparatus according to claim 15, wherein said control means controls distance to the subject, which is controlled by the focusing lens, to a short-distance limit in front of the image sensing apparatus or to a point near the short-distance limit.

10 17. The apparatus according to claim 15, further comprising subject-distance setting means for setting a subject distance controlled by the focusing lens, which is controlled by said control means.

15 18. The apparatus according to claim 15, further comprising memory means for storing the subject distance controlled by the focusing lens when said sensing means has sensed that the display direction of the image on said display means is being moved to the side of the subject, wherein when said sensing means no longer senses that the display direction 20 of the image on said display means is being moved to the side of the subject, said control means controls the focusing lens to the subject distance that has been stored by said memory means.

25 19. The apparatus according to claim 1, further comprising automatic focusing means for executing automatic focusing after the focusing lens has been controlled by said control

means.

20. The apparatus according to claim 15, further comprising automatic focusing means for executing automatic focusing after the focusing lens has been controlled by said control  
5 means.

21. The apparatus according to claim 3, wherein said subject-distance setting means is capable of setting a subject distance within a range of 10 cm to 1 m.

22. The apparatus according to claim 17, wherein said  
10 subject-distance setting means is capable of setting a subject distance within a range of 10 cm to 1 m.

23. An image sensing apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for deciding magnification of a sensed image, said apparatus  
15 comprising:

display means capable of displaying the image sensed by said image sensing device;

moving means for moving display direction of said display means to a direction on the side of the subject;

20 sensing means for sensing that the display direction of the image on said display means is being moved to the side of the subject by said moving means;

memory means for storing the sensed-image magnification controlled by the zoom lens, as well as the  
25 subject distance controlled by the focusing lens, when said sensing means has sensed that the display direction of the

image on said display means is being moved to the side of the subject; and

control means for controlling the zoom lens to the sensed-image magnification that has been stored by said

5 memory means and the focusing lens to the subject distance that has been stored by said memory means when said sensing means no longer senses that the display direction of the image on said display means is being moved to the side of the subject.

10 24. An image sensing apparatus having an image sensing device for sensing the image of a subject, and a zoom lens for deciding magnification of a sensed image, said apparatus: comprising display means capable of displaying the image sensed by said image sensing device;

15 moving means for moving display direction of the display means to a direction on the side of the subject,;

sensing means for sensing that the display direction of the image on said display means is being moved to the side of the subject by said moving means,;

20 memory means for storing the sensed-image magnification controlled by the zoom lens when said sensing means has sensed that the display direction of the image on said display means is being moved to the side of the subject, and

25 control means for controlling the zoom lens to the sensed-image magnification that has been stored by said

memory means when said sensing means no longer senses that the display direction of the image on said display means is being moved to the side of the subject.

25. An image sensing apparatus having an image sensing device  
5 for sensing the image of a subject, and a focusing lens for deciding focal point position of the subject whose image is sensed by the image sensing device, said apparatus comprising:

display means capable of displaying the image sensed  
10 by said image sensing device;

moving means for moving display direction of said display means to a direction on the side of the subject;

sensing means for sensing that the display direction of the image on said display means is being moved to the side  
15 of the subject by said moving means;

memory means for storing the subject distance controlled by the focusing lens when said sensing means has sensed that the display direction of the image on said display means is being moved to the side of the subject; and

20 control means for controlling the focusing lens to the subject distance that has been stored by said memory means when the sensing means no longer senses that the display direction of the image on said display means is being moved to the side of the subject.

25 26. A method of performing photography with an image sensing apparatus by which a photographer can be perform self-

photography, wherein in a case where said image sensing apparatus has at least one of an automatic exposure function, automatic focusing function and zoom function, parameters different from those at the time of ordinary photography are 5 set when it is sensed that the photographer is performing self-photography.

27. The method according to claim 26, wherein in a case where said image sensing apparatus has the automatic exposure function or the automatic focusing function, a photometry 10 area is narrowed to a central portion more at the time of self-photography than at the time of ordinary photography.

28. The method according to claim 26, wherein in a case where said image sensing apparatus has the zoom function, magnification of a sensed image is initially set to the 15 vicinity of a wide-angle limit and distance to a subject is initially set to a short distance in front of the image sensing apparatus.

29. The method according to claim 26, further including steps of:

20 saving sensed-image magnification and distance to a subject that prevailed at the time of ordinary photography if self-photography is sensed; and

restoring the saved sensed-image magnification and distance to the subject when ordinary photography is 25 restored.

30. A storage medium for storing, in computer readable

fashion, a control program for controlling an image sensing apparatus by which a photographer can be perform self-photography, said control program including at least a step of setting parameters, which are used in an automatic

5 exposure function, automatic focusing function and zoom function, to parameters different from those at the time of ordinary photography when it is sensed that the photographer is performing self-photography.

ABSTRACT OF THE DISCLOSURE

An image sensing apparatus provides optimum video not only during ordinary shooting but also when the photographer faces the camera to shoot video of him/herself. When the 5 photographer performs such self-photography, the subject (i.e., the photographer) is situated at the center of the scene. Accordingly, in order to eliminate the effects of a peripheral spot-lighted subject or the like, a photometry area used for automatic exposure control or automatic 10 focusing is narrowed to a central portion more at the time of self-photography than at the time of ordinary photography. This provides video having proper exposure without influence from peripheral brightness such as a spotlight. Further, when self-photography is sensed, the magnification of a 15 sensed image by a zoom lens is controlled to the vicinity of a wide-angle limit and the distance to the subject, which is controlled by a focusing lens, is controlled to a short distance in front of the image sensing apparatus.

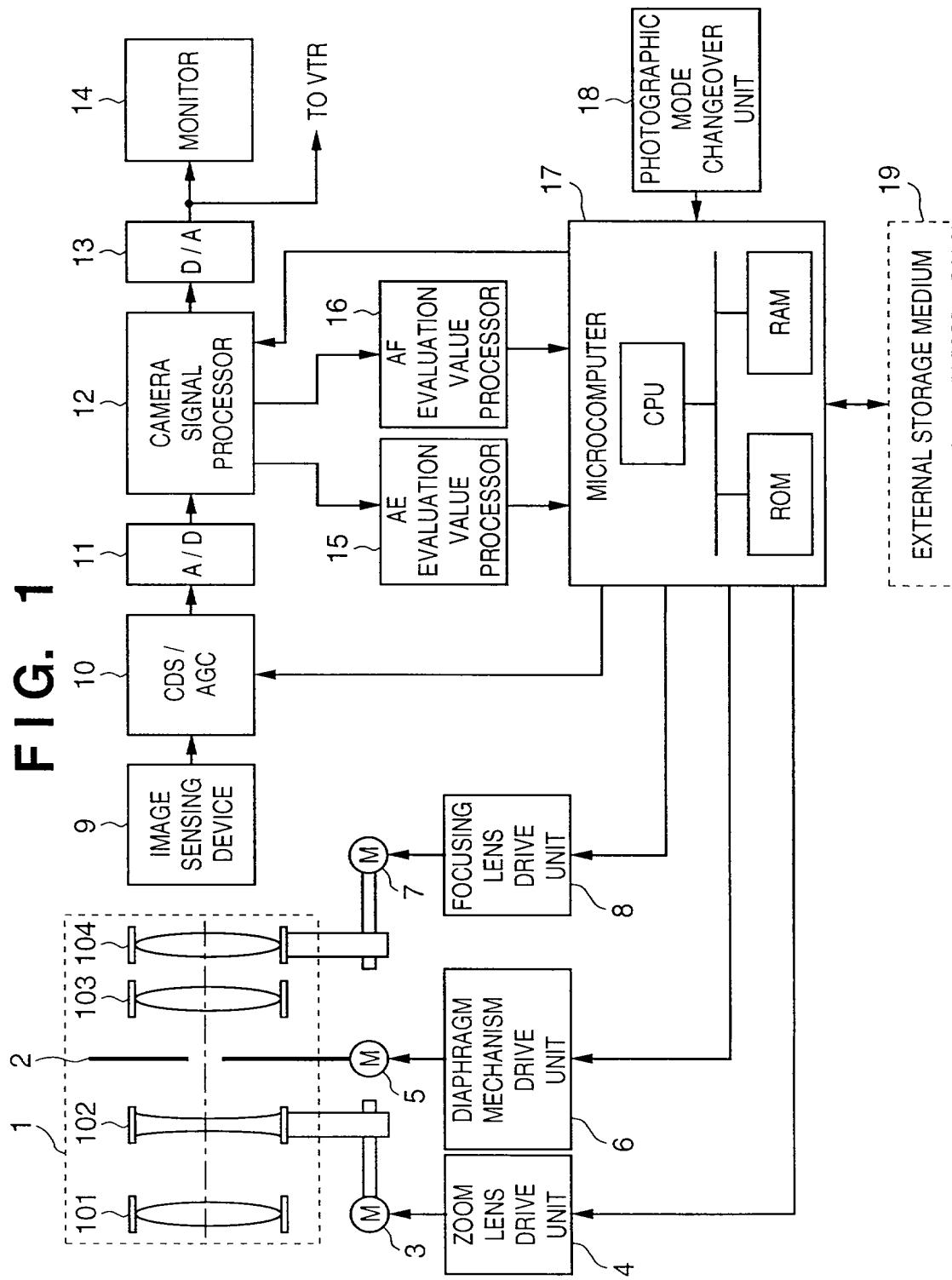
**FIG. 1**

FIG. 2

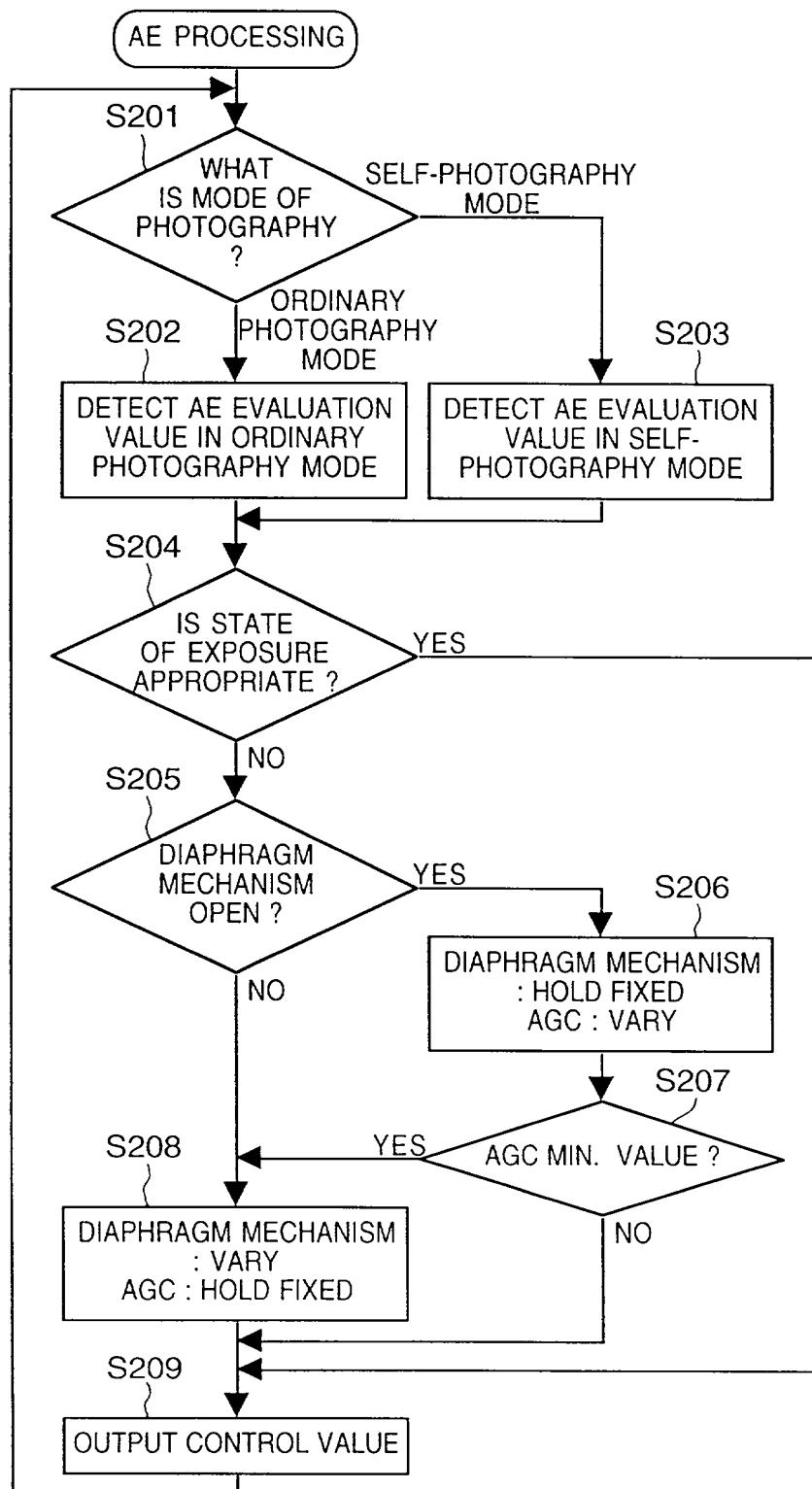
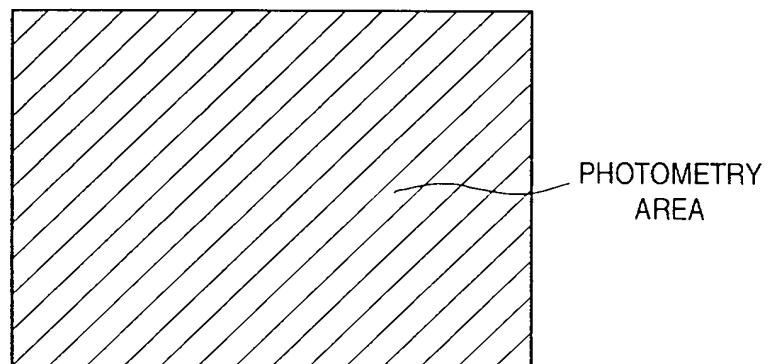


FIG. 3A

## ORDINARY PHOTOGRAPHY



## FIG. 3B

## SELF-PHOTOGRAPHY

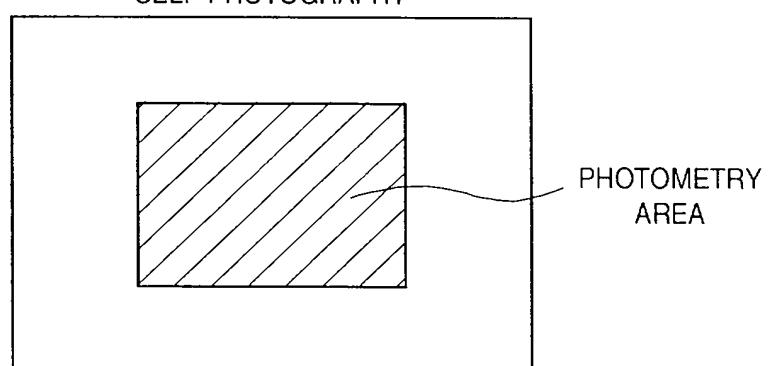


FIG. 4A

ORDINARY PHOTOGRAPHY

a1	a2	a3	a4	a5
a6	a7	a8	a9	a10
a11	a12	a13	a14	a15
a16	a17	a18	a19	a20
a21	a22	a23	a24	a25

AE EVALUATION VALUE OF EACH AREA	WEIGHTING COEFFICIENT (k)
$a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot a_5$ $a_6 \cdot a_{10} \cdot a_{11} \cdot a_{15}$ $a_{16} \cdot a_{20} \cdot a_{21} \cdot a_{22}$ $a_{23} \cdot a_{24} \cdot a_{25}$	0.8
$a_7 \cdot a_8 \cdot a_9$ $a_{12} \cdot a_{13} \cdot a_{14}$ $a_{17} \cdot a_{18} \cdot a_{19}$	1.0

FIG. 4B

SELF-PHOTOGRAPHY

a1	a2	a3	a4	a5
a6	a7	a8	a9	a10
a11	a12	a13	a14	a15
a16	a17	a18	a19	a20
a21	a22	a23	a24	a25

AE EVALUATION VALUE OF EACH AREA	WEIGHTING COEFFICIENT (k)
$a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot a_5$ $a_6 \cdot a_{10} \cdot a_{11} \cdot a_{15}$ $a_{16} \cdot a_{20} \cdot a_{21} \cdot a_{22}$ $a_{23} \cdot a_{24} \cdot a_{25}$	0.1
$a_7 \cdot a_8 \cdot a_9$ $a_{12} \cdot a_{14}$ $a_{17} \cdot a_{18} \cdot a_{19}$	0.8
a13	1.0

FIG. 5

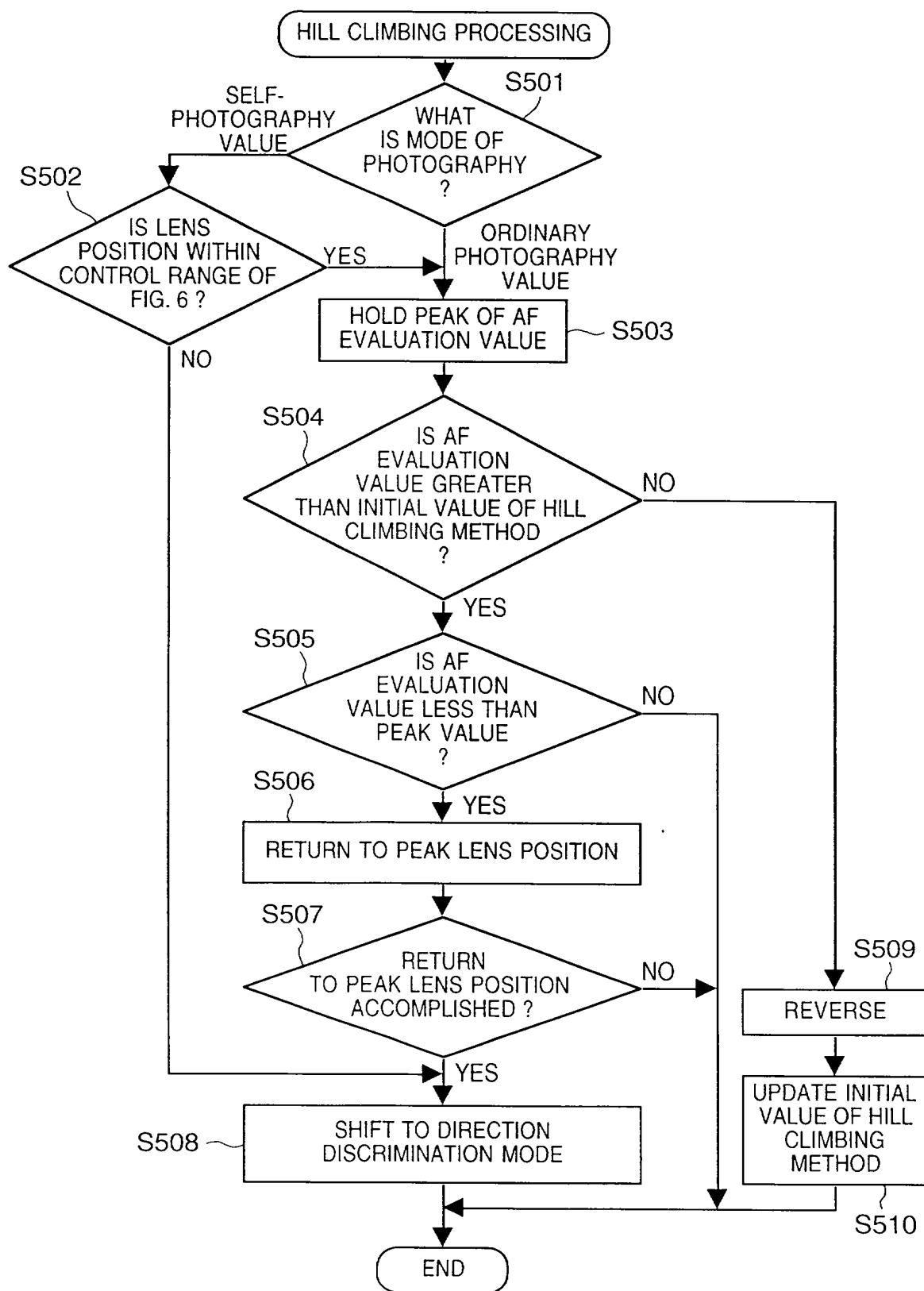


FIG. 6

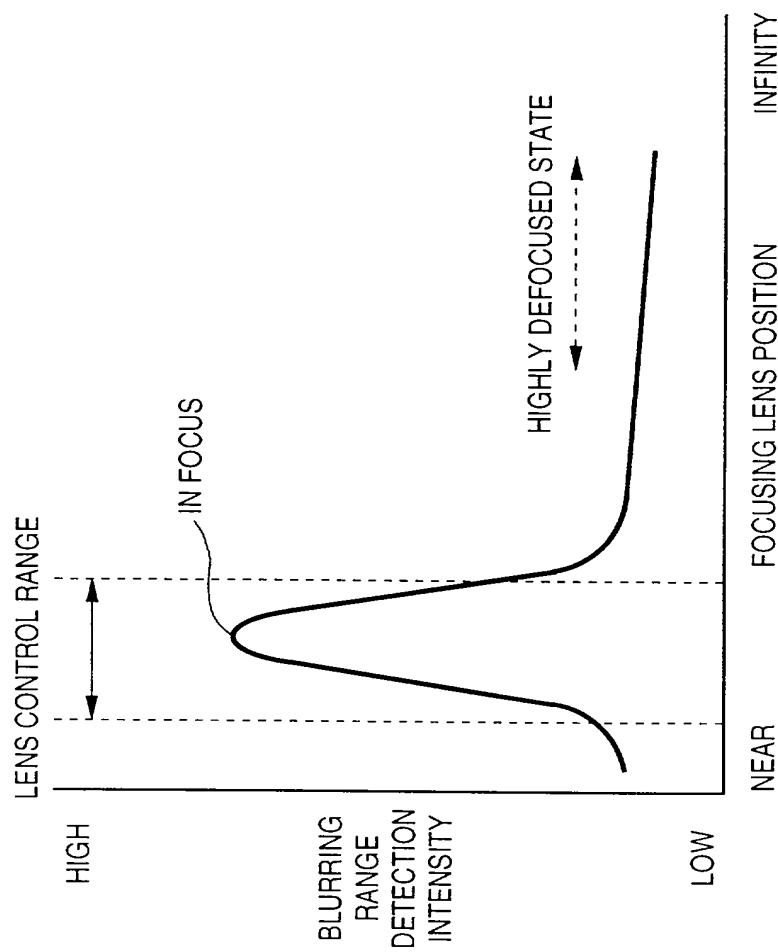
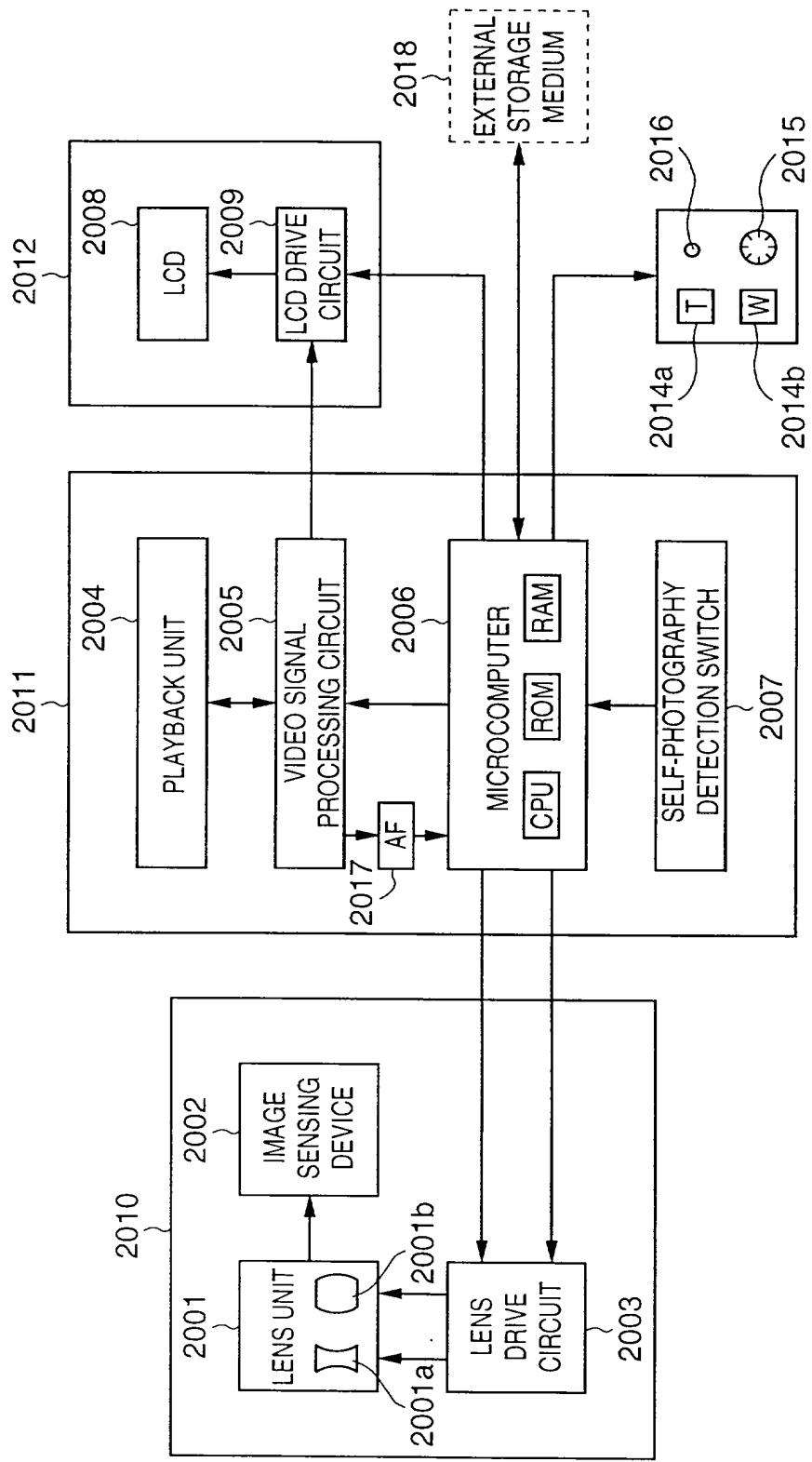
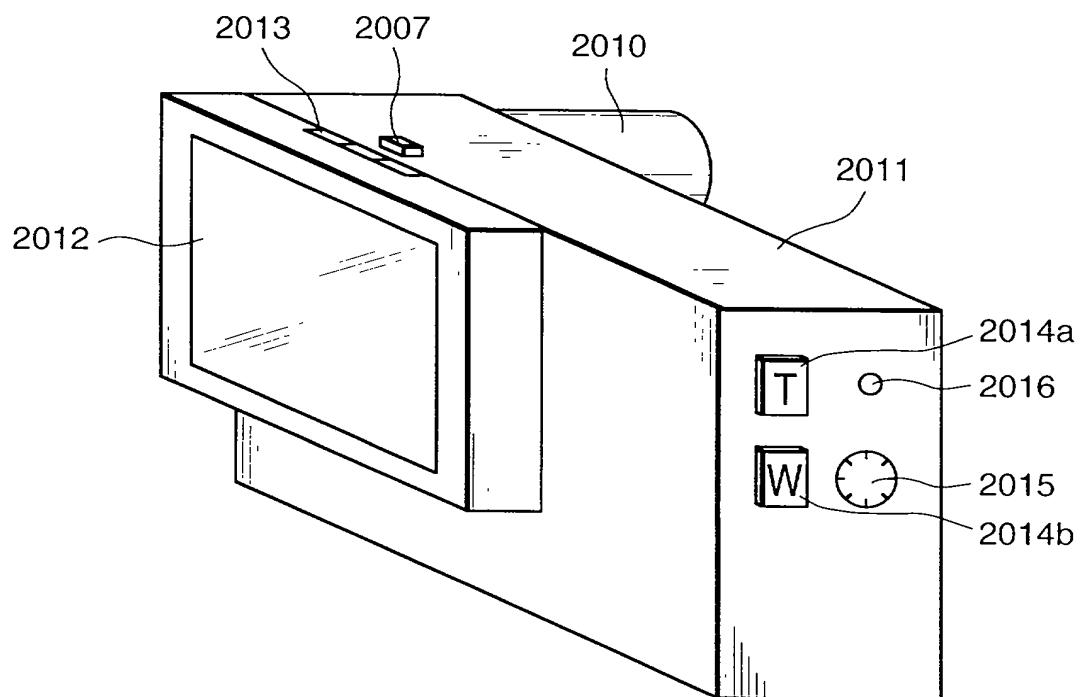
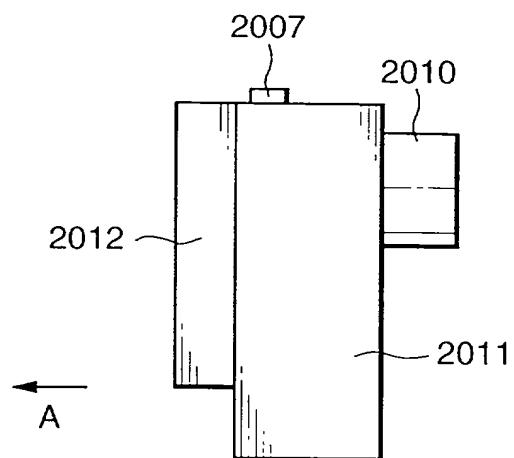


FIG. 7

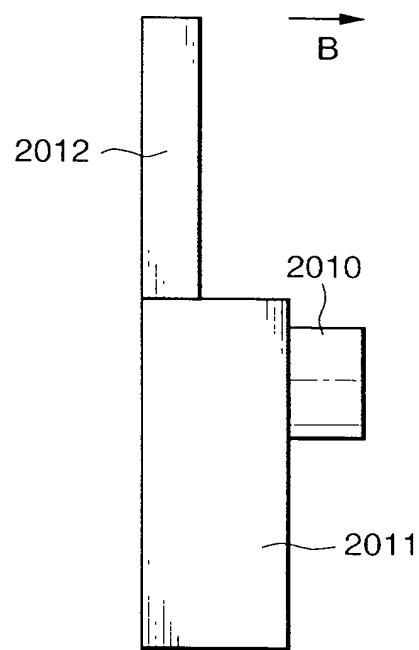


**F I G. 8**

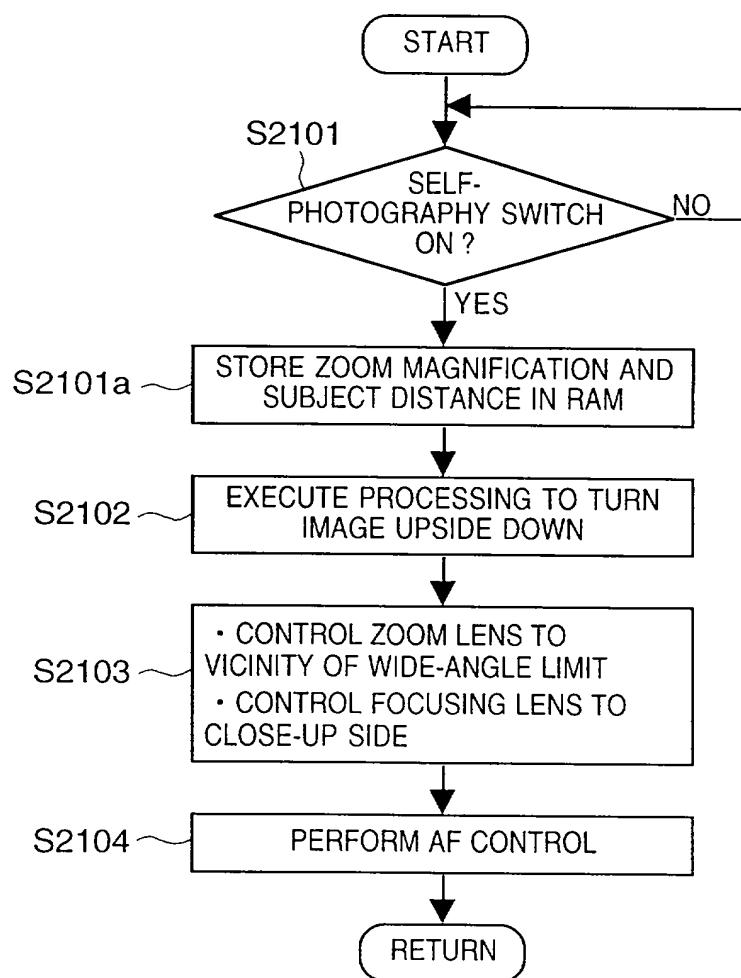
**F I G. 9A**



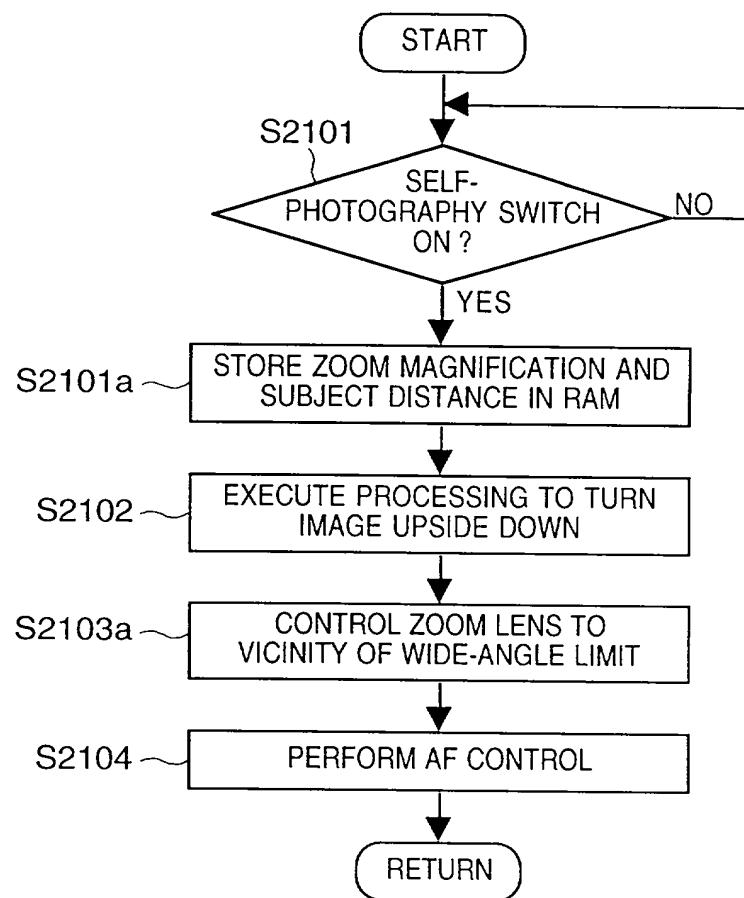
**F I G. 9B**



## F I G. 10



## F I G. 11



## F I G. 12

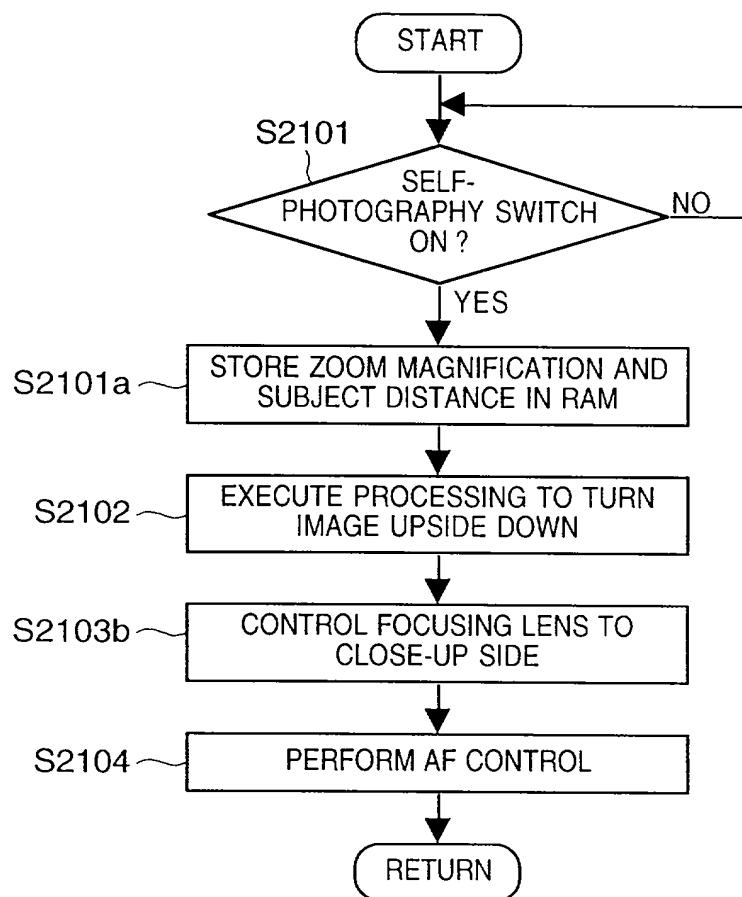
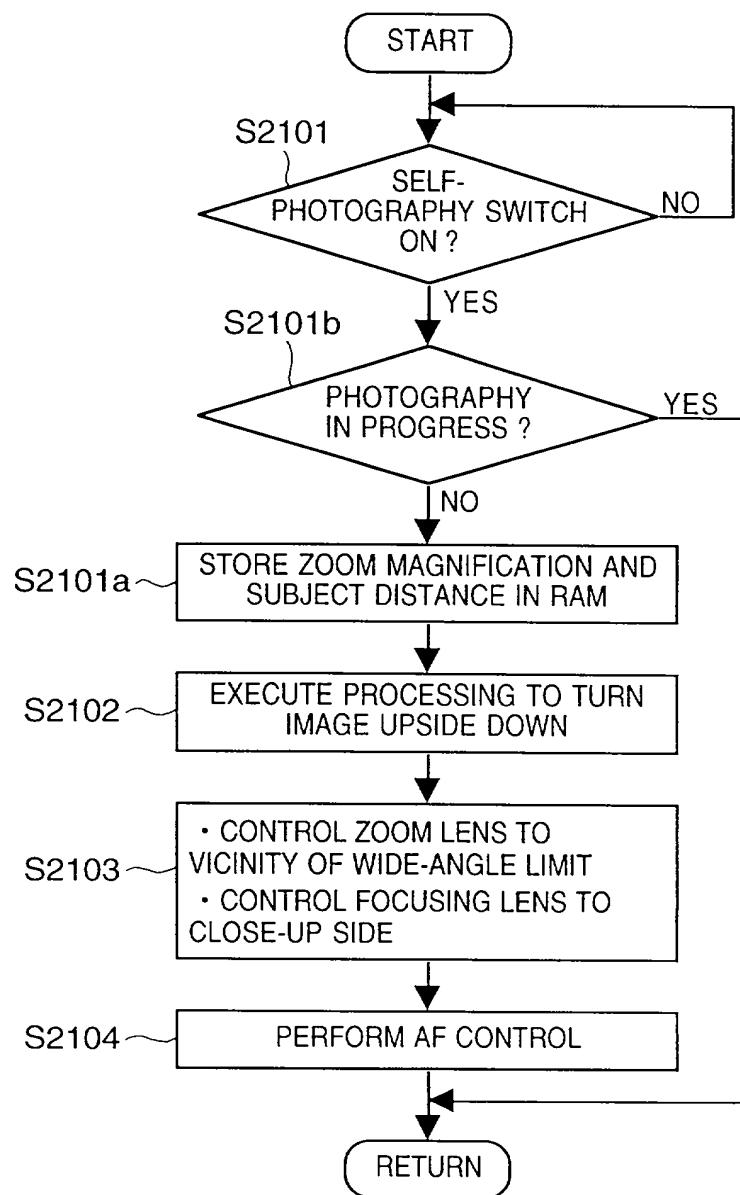
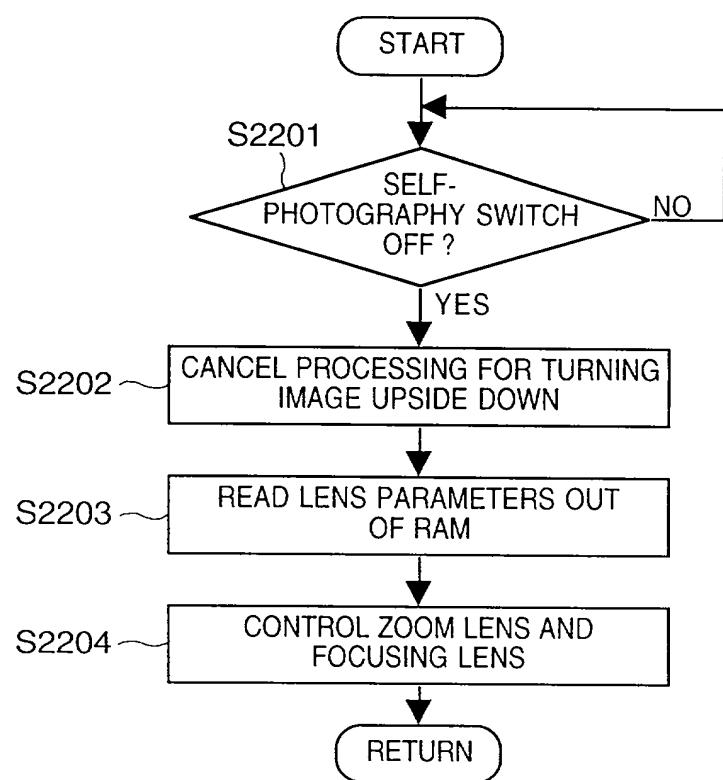


FIG. 13

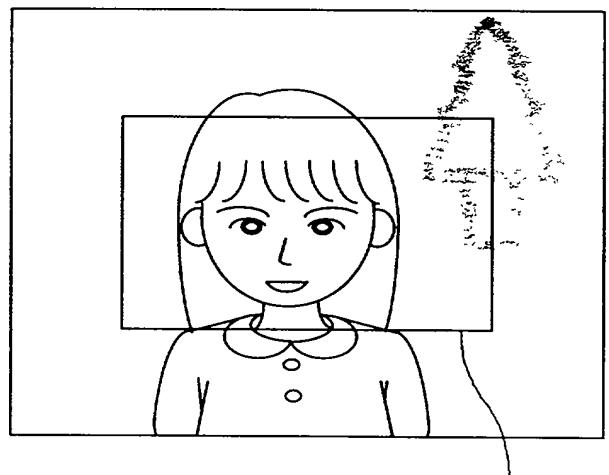


## FIG. 14



## FIG. 15A

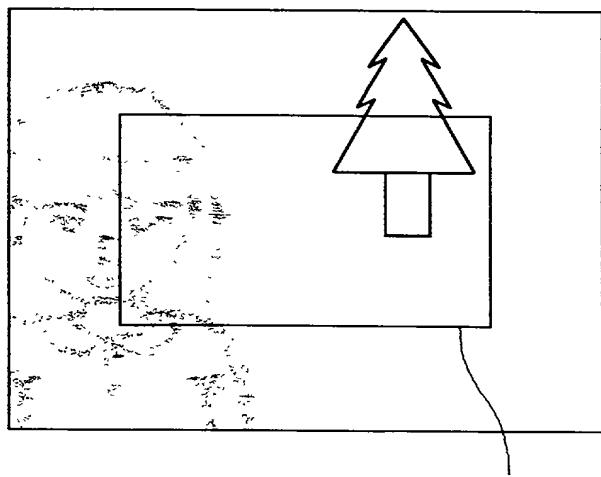
WHEN MAIN SUBJECT IS IN FOCUS



AF PHOTOMETRY AREA

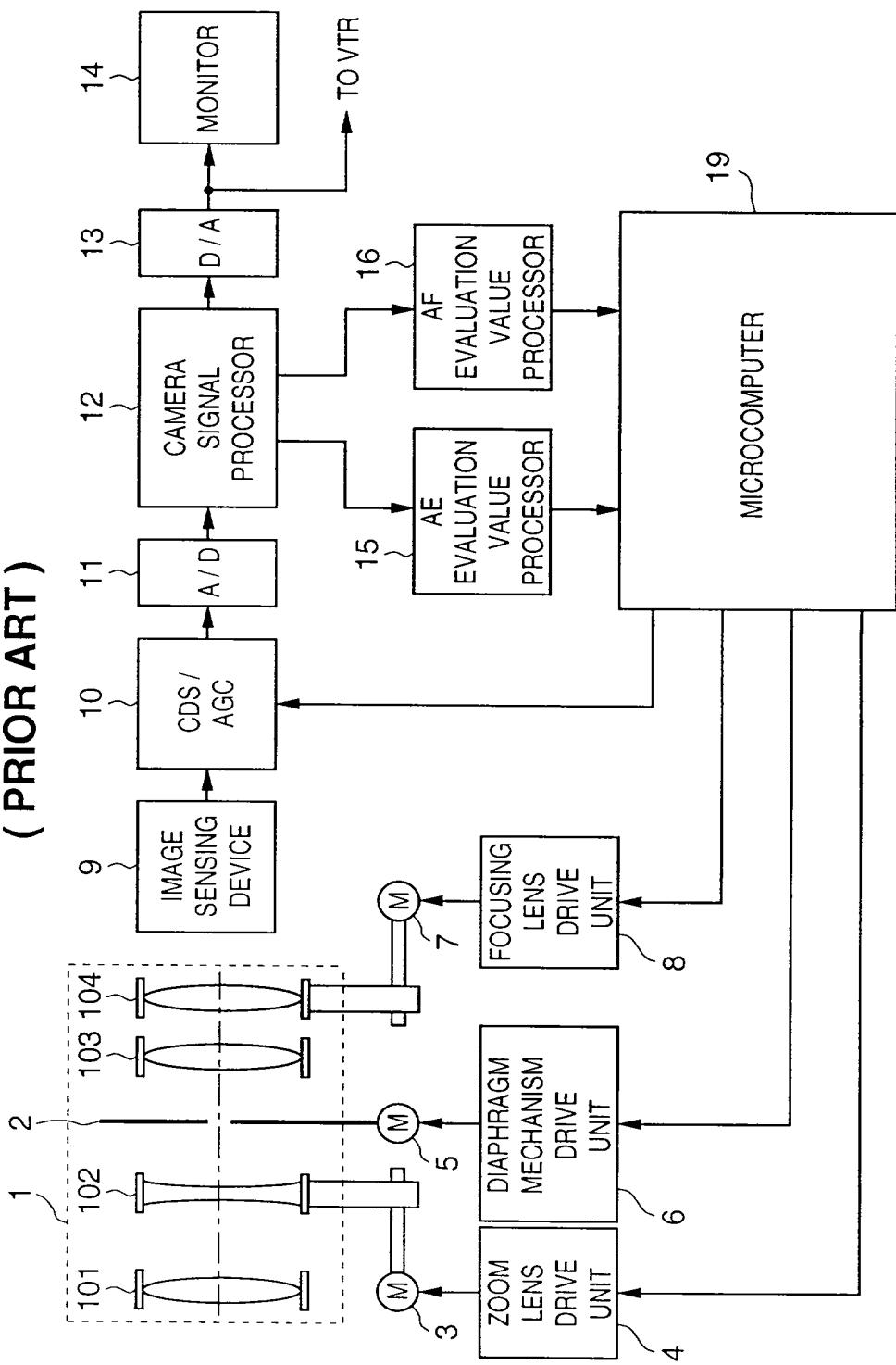
## FIG. 15B

WHEN BACKGROUND IS IN FOCUS

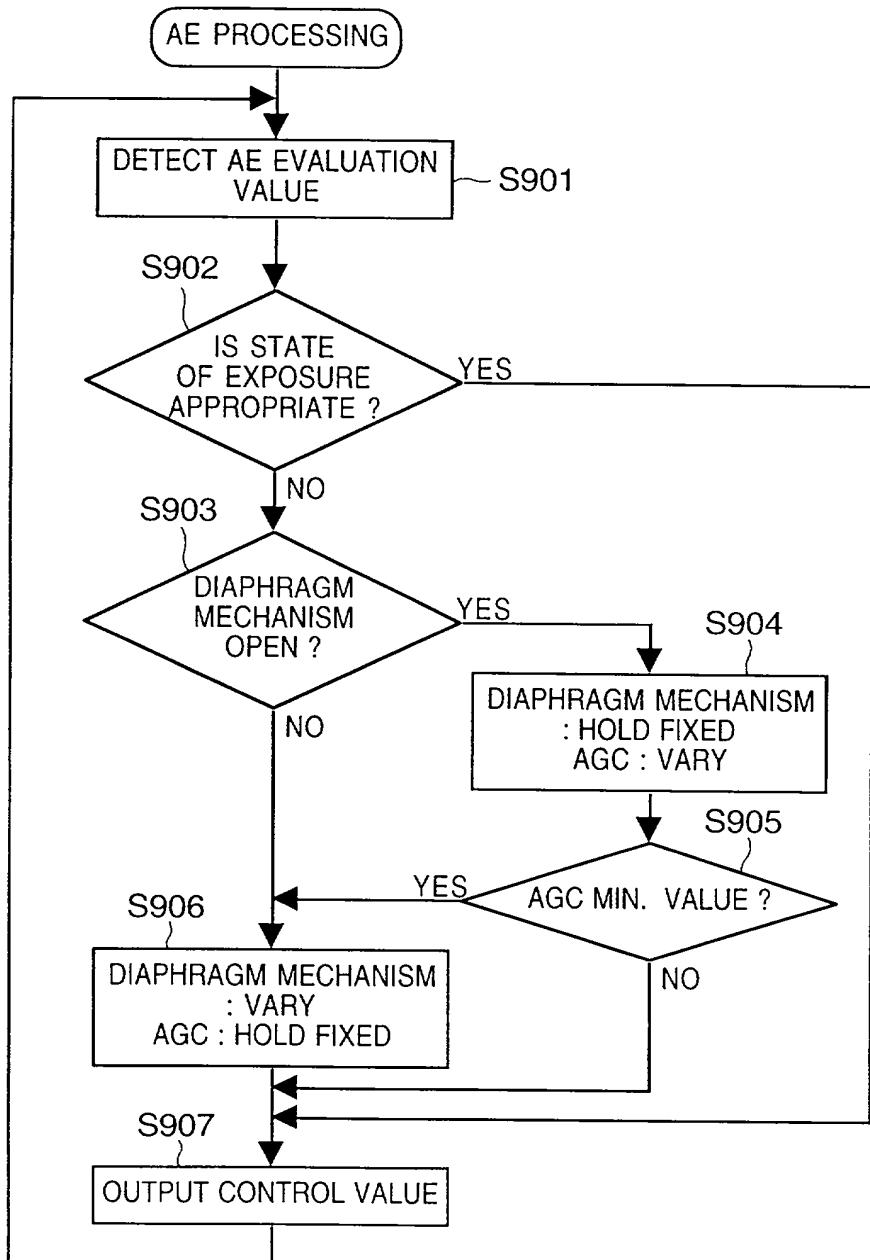


AF PHOTOMETRY AREA

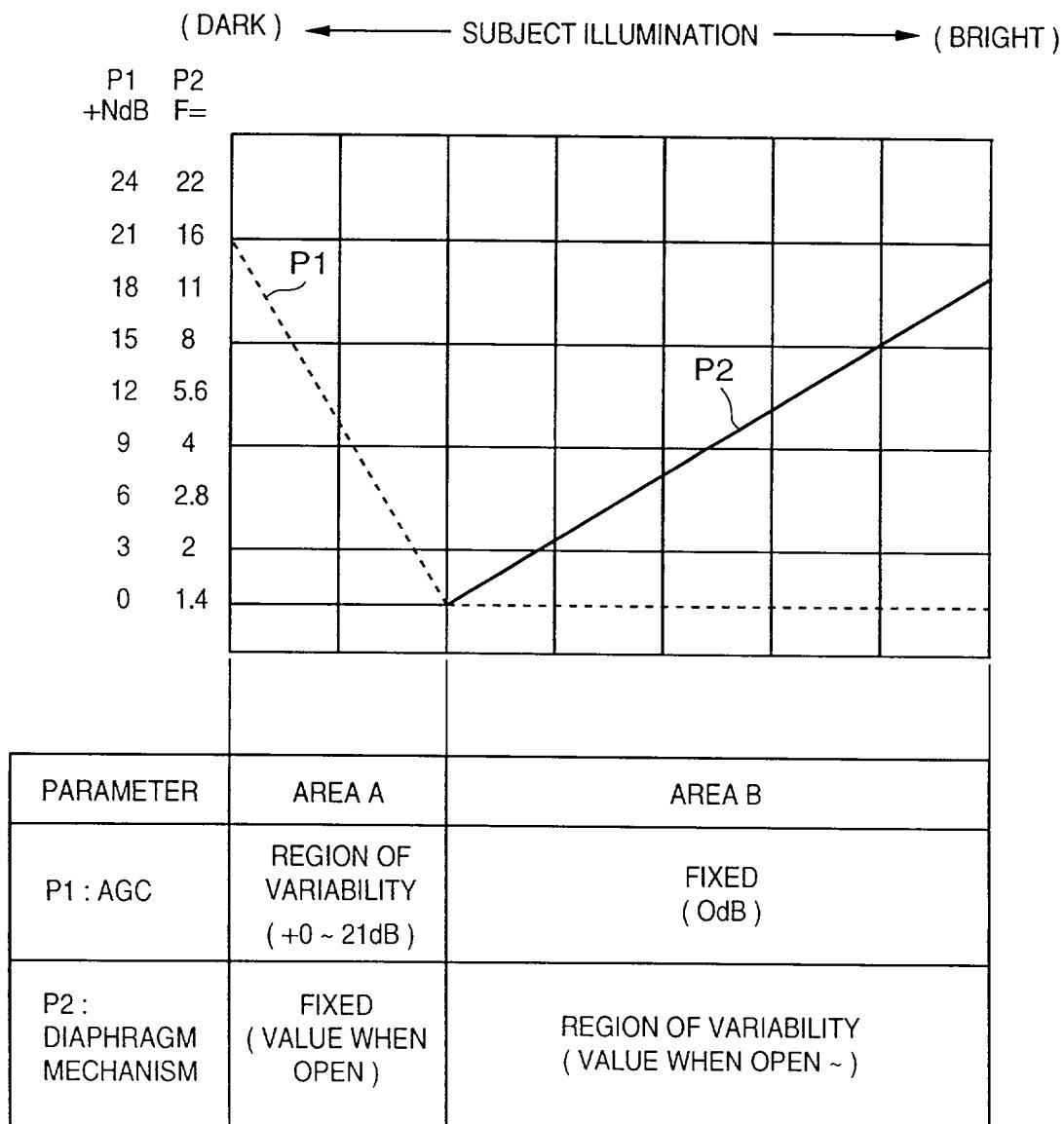
**FIG. 16**  
(PRIOR ART)



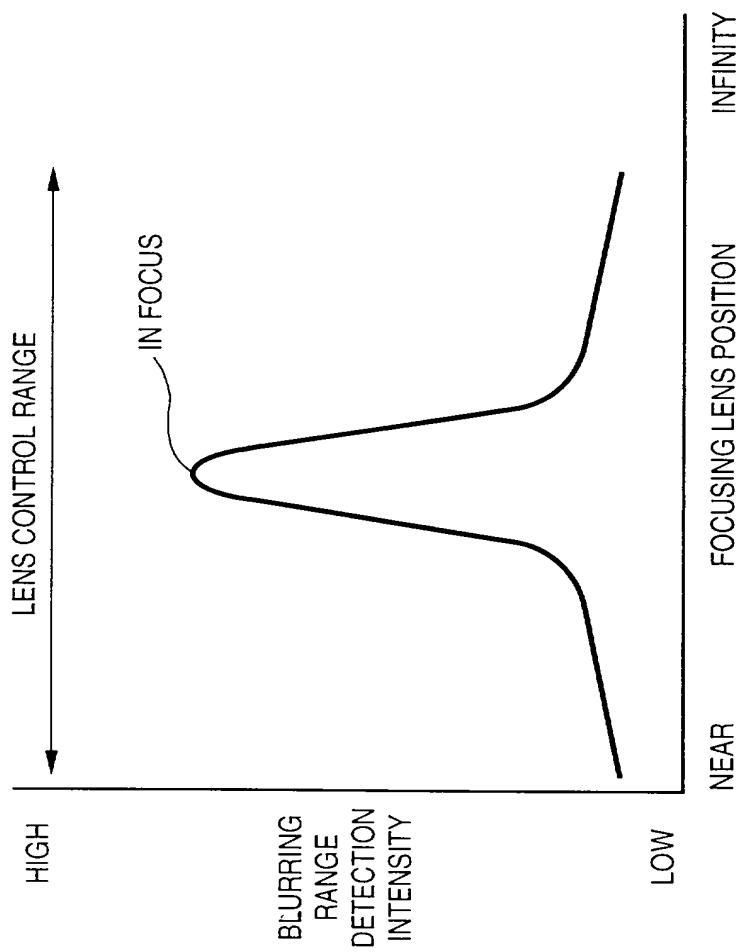
**F I G. 17**  
**( PRIOR ART )**



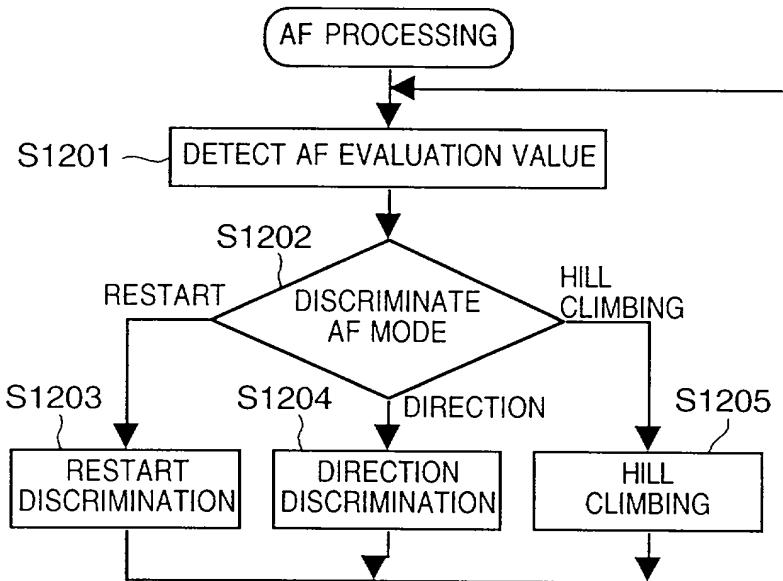
**FIG. 18**  
**( PRIOR ART )**



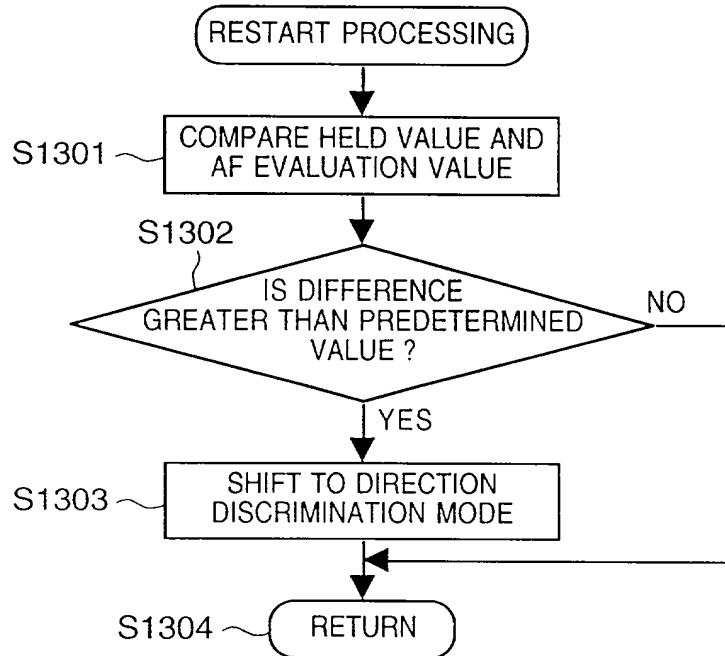
**FIG. 19**  
(PRIOR ART)



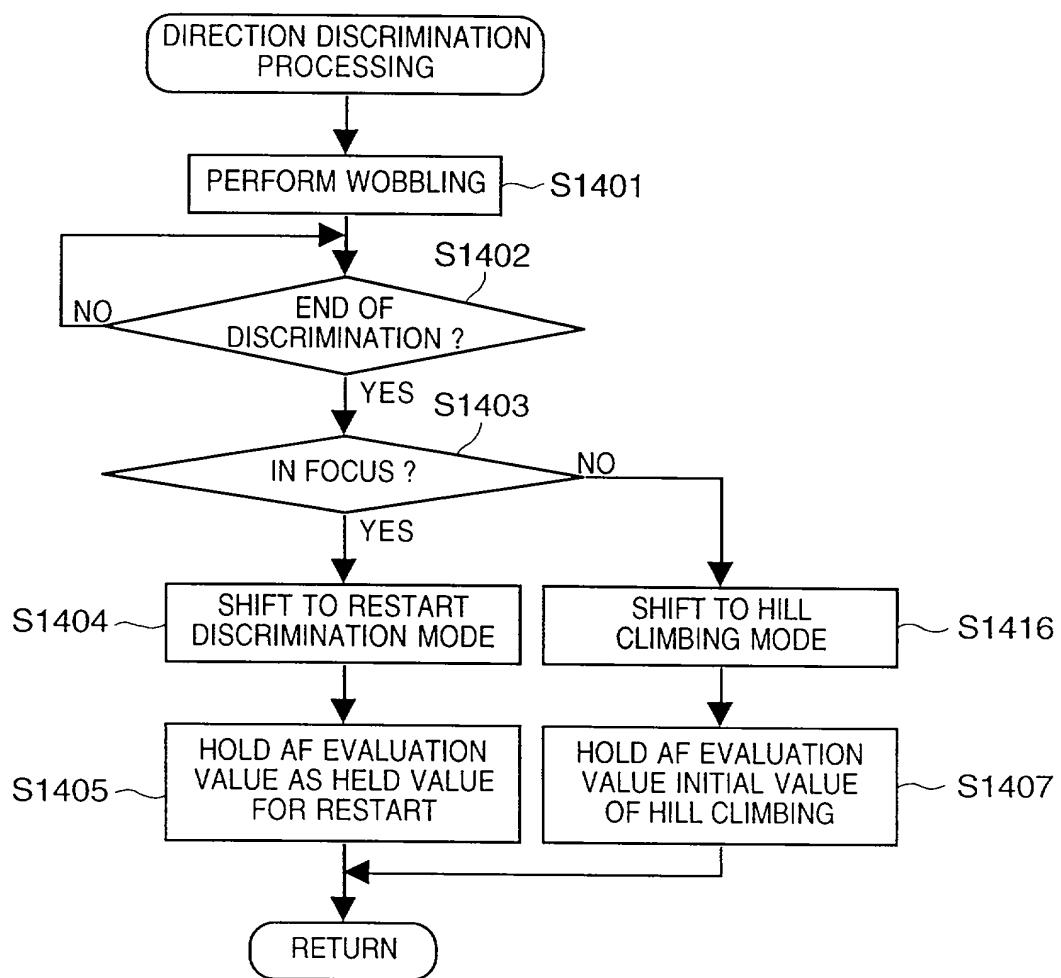
**FIG. 20**  
( PRIOR ART )



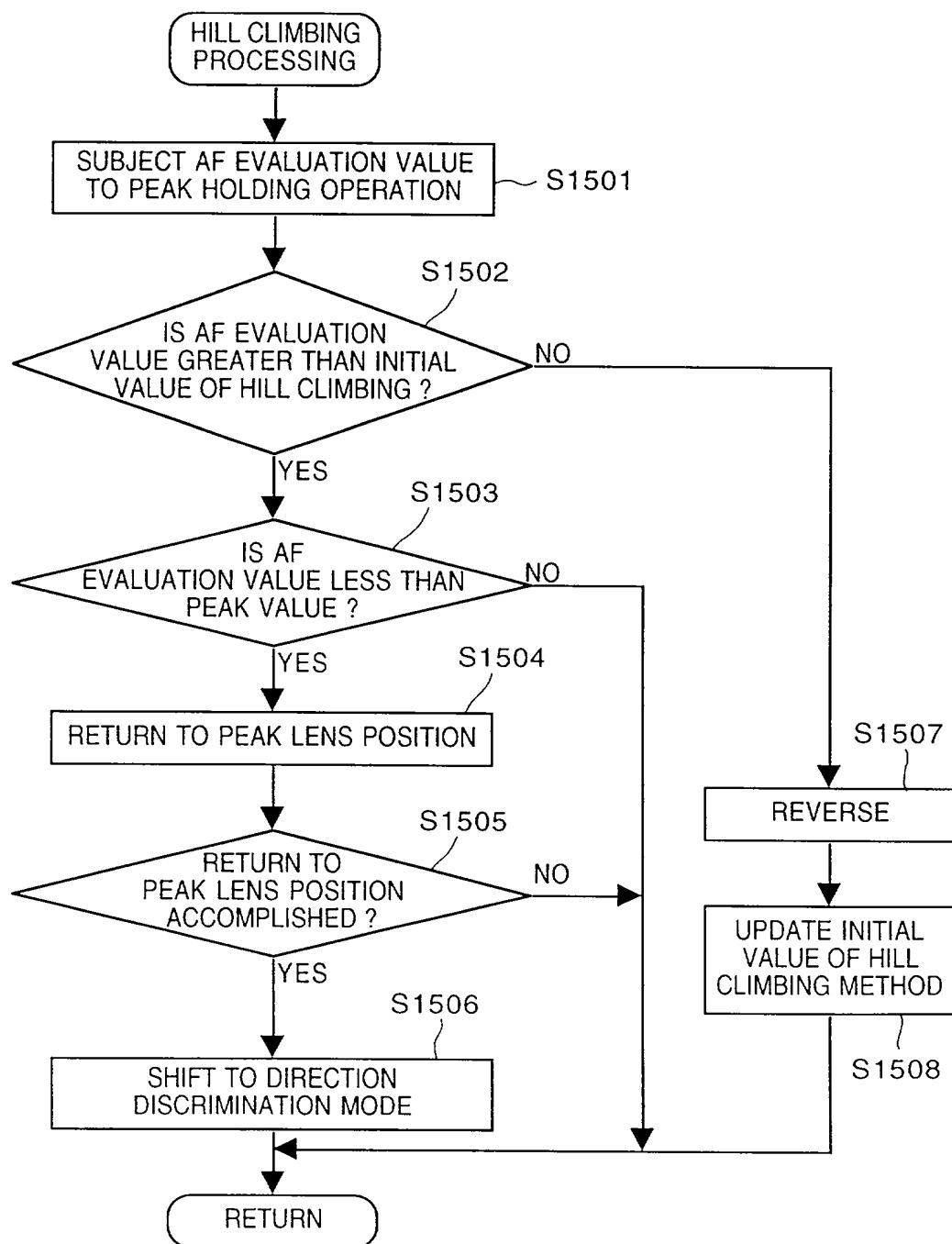
**FIG. 21**  
( PRIOR ART )

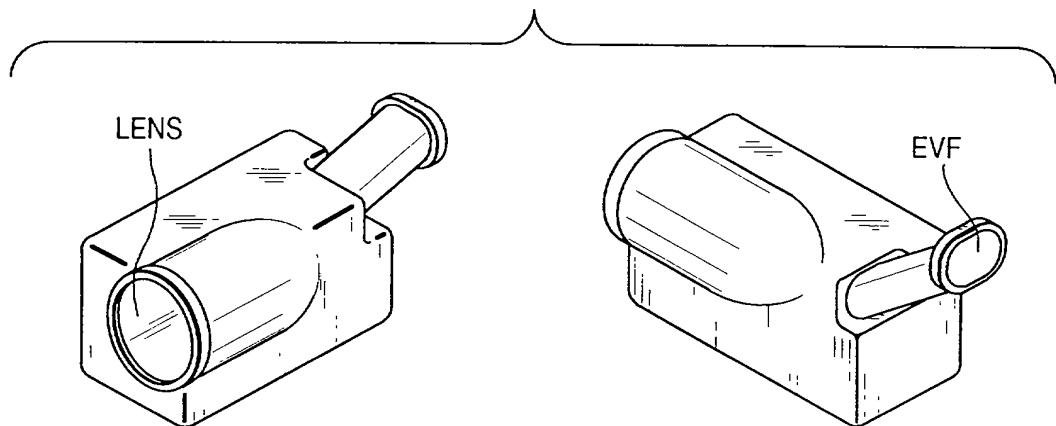
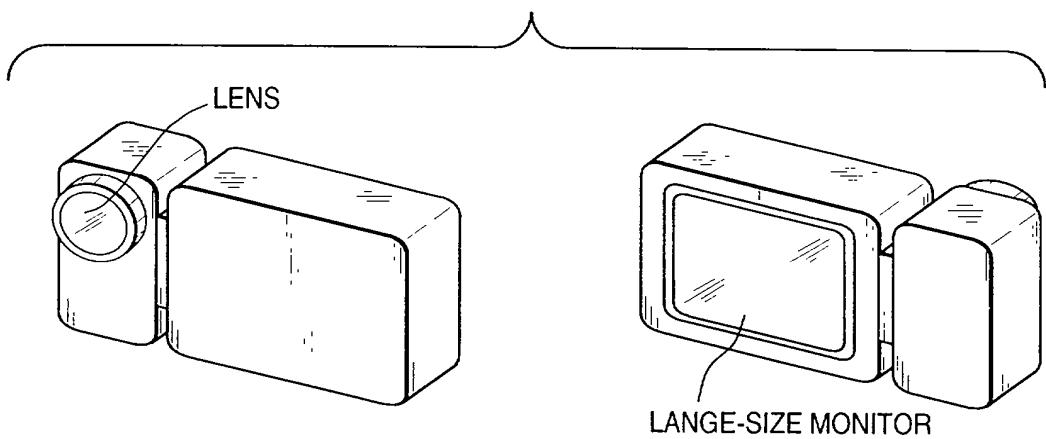
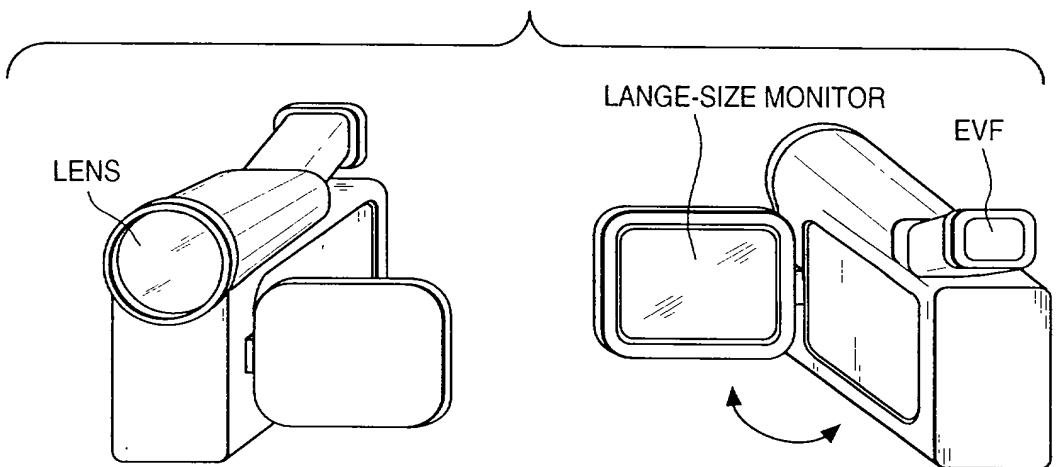


**F I G. 22**  
( PRIOR ART )

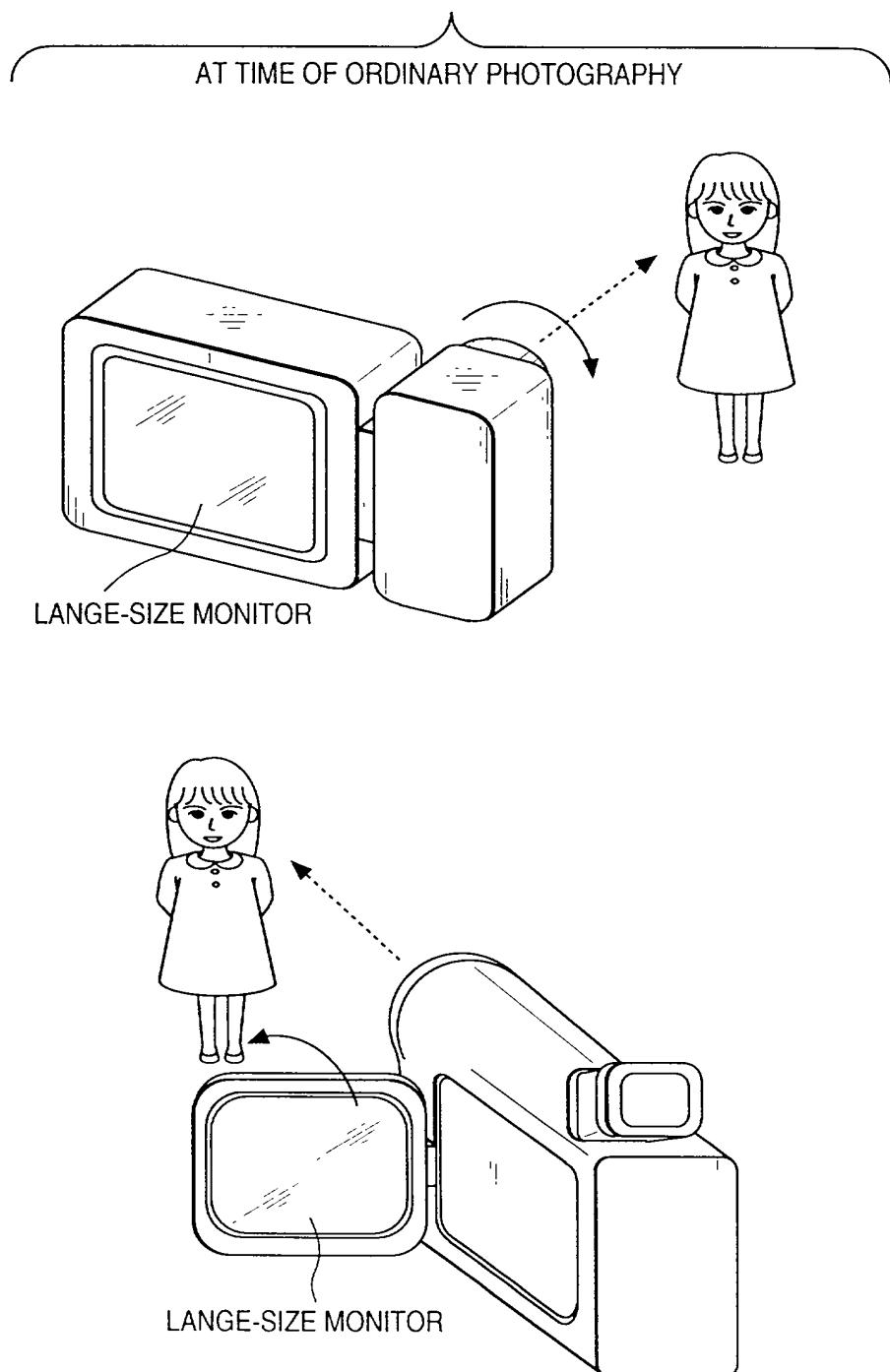


**F I G. 23**  
( PRIOR ART )



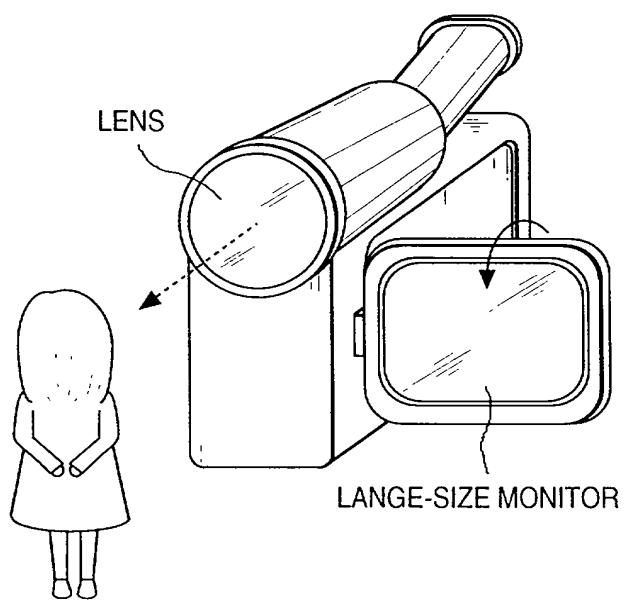
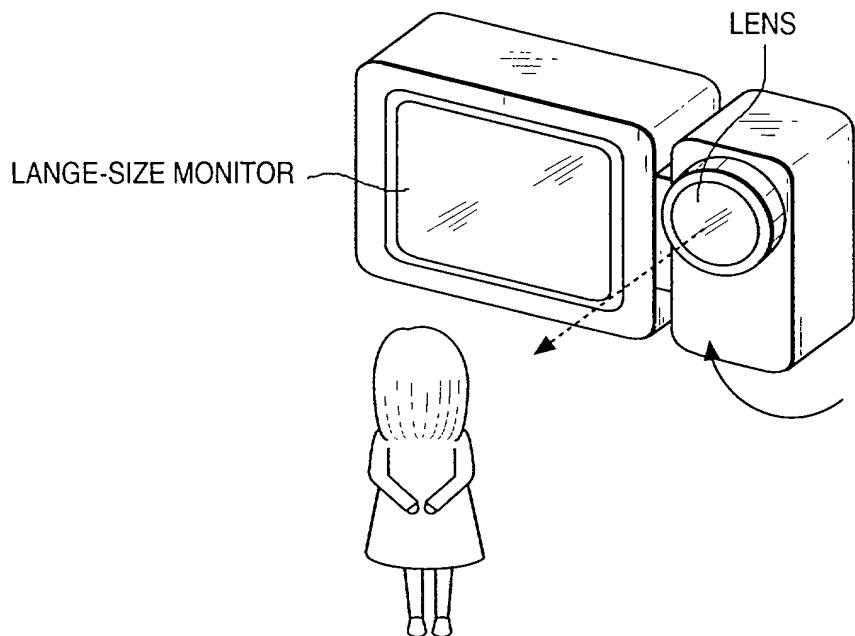
**FIG. 24A****FIG. 24B****FIG. 24C**

## F I G. 25A

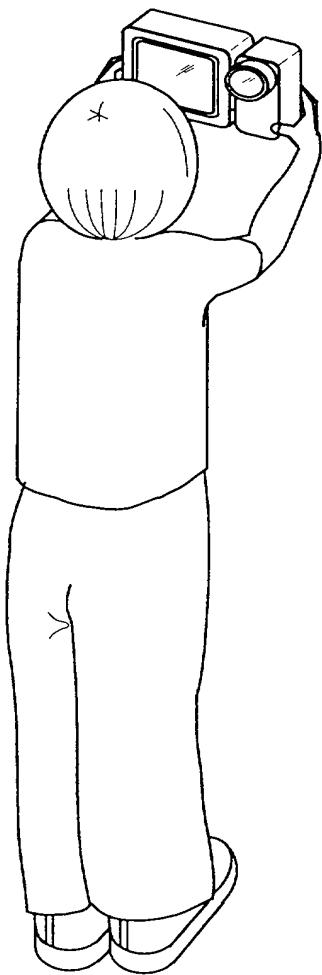


## FIG. 25B

AT TIME OF SELF-PHOTOGRAPHY



**FIG. 26**



Docket No. \_\_\_\_\_

**COMBINED DECLARATION AND POWER OF ATTORNEY FOR  
ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,  
DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PHOTOGRAPHIC METHOD AT TIME OF SELF-PHOTOGRAPHY, AND IMAGE SENSING  
APPARATUS THEREFOR

the specification of which

- a. [  ] is attached hereto
- b. [  ] was filed on \_\_\_\_\_ as application Serial No. \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

**PCT FILED APPLICATION ENTERING NATIONAL STAGE**

- C. [  ] was described and claimed in International Application No. \_\_\_\_\_ filed on \_\_\_\_\_ and as amended on \_\_\_\_\_ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby specify the following as the correspondence address to which all communications about this application are to be directed:

SEND CORRESPONDENCE TO: MORGAN & FINNEGAN, L.L.P.  
345 Park Avenue  
New York, N.Y. 10154

DIRECT TELEPHONE CALLS TO: Michael M. Murray  
(212) 758-4800

[X] I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a)-(d) or under § 365(b) of any foreign application(s) for patent or inventor's certificate or under § 365(a) of any PCT international application(s) designating at least one country other than the U.S. listed below and also have identified below such foreign application(s) for patent or inventor's certificate or such PCT international application(s) filed by me on the same subject matter having a filing date within twelve (12) months before that of the application on which priority is claimed:

[X] The attached 35 U.S.C. § 119 claim for priority for the U.S. application(s) listed below forms a part of this declaration.

Docket No. \_\_\_\_\_

<u>Country/PCT</u>	<u>Application Number</u>	<u>Date of filing (day,month,yr)</u>	<u>Date of issue (day,month,yr)</u>	<u>Priority Claimed</u>
Japan	9-127007	16, 05, 1997		[X] YES [ ] NO
Japan	9-176921	02, 07, 1997		[X] YES [ ] NO
				[ ] YES [ ] NO

[ ] I hereby claim the benefit under 35 U.S.C. § 119(e) of any U.S. provisional application(s) listed below.

Provisional Application No. \_\_\_\_\_

Date of filing (day, month, yr) \_\_\_\_\_

**ADDITIONAL STATEMENTS FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART  
OR PCT INTERNATIONAL APPLICATION(S DESIGNATING THE U.S.)**

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or under § 365(c) of any PCT international application(s) designating the U.S. listed below.

US/PCT Application Serial No.	Filing Date,	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)
-------------------------------	--------------	---

US/PCT Application Serial No.	Filing Date,	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)
-------------------------------	--------------	---

[ ] In this continuation-in-part application, insofar as the subject matter of any of the claims of this application is not disclosed in the above listed prior United States or PCT international application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys and/or agents with full power of substitution and revocation, to prosecute this application, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith: John A. Diaz (Reg. No. 19,550), John C. Vassil (Reg. No. 19,098), Alfred P. Ewert (Reg. No. 19,887), David H. Pfeffer, P.C. (Reg. No. 19,825), Harry C. Marcus (Reg. No. 22,390), Robert E. Paulson (Reg. No. 21,046), Stephen R. Smith (Reg. No. 22,615), Kurt E. Richter (Reg. No. 24,052), J. Robert Dailey (Reg. No. 27,434), Eugene Moroz (Reg. No. 25,237), John F. Sweeney (Reg. No. 27,471), Arnold I. Rady (Reg. No. 26,601), Christopher A. Hughes (Reg. No. 26,914), William S. Feiler (Reg. No. 26,728), Joseph A. Calvaruso (Reg. No. 28,287), James W. Gould

351265\_1

Docket No. \_\_\_\_\_

(Reg. No. 28,859), Richard C. Komson (Reg. No. 27,913), Israel Blum (Reg. No. 26,710), Bartholomew Verdirame (Reg. No. 28,483), Maria C. H. Lin (Reg. No. 29,323), Joseph A. DeGirolamo (Reg. No. 28,595), Michael A. Nicodema (Ref. No. 33,199), Michael P. Dougherty (Ref. No. 32,730), Seth J. Altas (Reg. No. 32,454), Andrew M. Riddles (Reg. No. 31,657), Bruce D. DeRenzi (Reg. No. 33,676), Michael M. Murray (Reg. No. 32,537) and Mark J. Abate (Reg. No. 32,527) of Morgan & Finnegan, L.L.P. whose address is: 345 Park Avenue, New York, New York 10154; and Edward A. Pennington (Reg. No. 32,588) of Morgan & Finnegan, L.L.P., whose address is: 1299 Pennsylvania Avenue, N.W., Suite 960, Washington, D.C. 20004.

[ ] I hereby authorize the U.S. attorneys and/or agents named hereinabove to accept and follow instructions from \_\_\_\_\_ as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and/or agents and me. In the event of a change in the person(s) from whom instructions may be taken I will so notify the U.S. attorneys and /or agents named hereinabove.

Full name of sole or first inventor Toshiyuki MATSUMOTO

Inventor's signature\* Toshiyuki Matsumoto  
600-2-502, Mizonokuchi, Takatsu-ku, date April 24, 1998  
Residence Kawasaki-shi, Kanagawa-ken, Japan

Citizenship JAPAN  
c/o CANON KABUSHIKI KAISHA,  
Post Office Address 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo, Japan

Full name of second joint inventor, if any Kyoji TAMURA  
Inventor's signature\* Kyoji Tamura  
1072-1-204, Ichigao-cho, Aoba-ku, date April 24, 1998  
Residence Yokohama-shi, Kanagawa-ken, Japan

Citizenship JAPAN  
c/o CANON KABUSHIKI KAISHA,  
Post Office Address 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo, Japan

[ ] ATTACHED IS ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY THIRD AND SUBSEQUENT INVENTORS FORM.

\* Before signing this declaration, each person signing must:

1. Review the declaration and verify the correctness of all information therein; and
2. Review the specification and the claims, including any amendments made to the claims.

After the declaration is signed, the specification and claims are not to be altered.

Docket No. \_\_\_\_\_

To the inventor(s):

The following are cited in or pertinent to the declaration attached to the accompanying application:

Title 37, Code of Federal Regulation, §1.56

Duty to disclose information material to patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

Title 35, U.S. Code § 101

Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Title 35 U.S. Code § 102

Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless --

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent,
- (b) the invention was patented or described in a printed publication in this or foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States, or

Docket No. \_\_\_\_\_

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other ...

#### Title 35, U.S. Code § 103

##### Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

#### Title 35, U.S. Code § 112 (in part)

##### Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

#### Title 35, U.S. Code, § 119

##### Benefit of earlier filing date in foreign country; right of priority

An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, shall have the same effect as the same application would have if filed in this

Docket No. \_\_\_\_\_

country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; but no patent shall be granted on any application for patent for an invention which had been patented or described in a printed publication in any country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country more than one year prior to such filing.

Title 35, U.S. Code, § 120

Benefit or earlier filing date in the United States

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.

Please read carefully before signing the Declaration attached to the accompanying Application.

If you have any questions, please contact Morgan & Finnegan, L.L.P.

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